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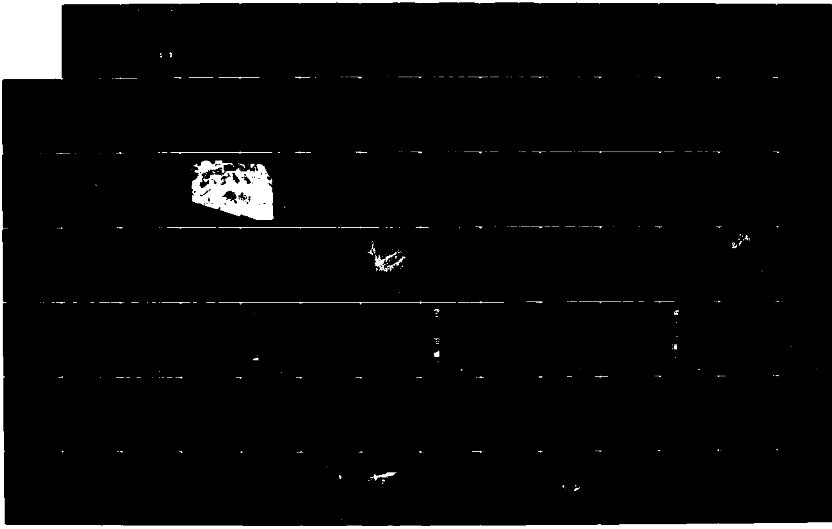

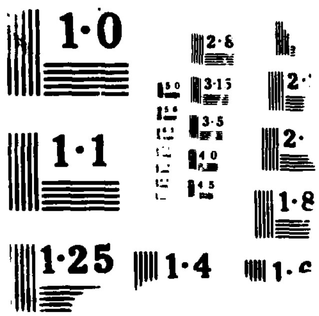
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INSTALLATION RESTORATION PROGRAM
PHASE II - CONFIRMATION/QUANTIFICATION

STAGE 3

FINAL REPORT FOR

MATHER AIR FORCE BASE,
SACRAMENTO, CALIFORNIA

AEROVIRONMENT INC.
825 MYRTLE AVENUE
MONROVIA, CALIFORNIA 91016

JANUARY 1988
FINAL REPORT (JULY 1986 TO FEBRUARY 1988)

APPROVED FOR PUBLIC RELEASE
DISTRIBUTION UNLIMITED

PREPARED FOR

HEADQUARTERS AIR TRAINING COMMAND
COMMAND SURGEON'S OFFICE (HQATC/SGPB)
BIOENVIRONMENTAL ENGINEERING DIVISION
RANDOLPH AFB, TEXAS 78150-5001

UNITED STATES AIR FORCE
OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (USAFOEHL)
TECHNICAL SERVICES DIVISION (TS)
BROOKS AIR FORCE BASE, TEXAS 78235-5501

AV-FR-86/596

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FEBRUARY 1988

PREPARED BY

AEROVIRONMENT INC.
825 MYRTLE AVENUE
MONROVIA, CALIFORNIA 91016

USAF CONTRACT NO. F33615-83-D4000, DELIVERY ORDER No. 12
AEROVIRONMENT PROJECT NO. 10416L

CAPTAIN DAVID GIBSON
USAFOEHL TECHNICAL PROGRAM MANAGER

UNITED STATES AIR FORCE
OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (USAFOEHL)
TECHNICAL SERVICES DIVISION (TS)
BROOKS AIR FORCE BASE, TEXAS 78235-5501

NOTICE

This report has been prepared for the United States Air Force by AeroVironment Inc., for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, nor the Department of Defense.

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AeroVironment Inc. conducted a Phase II, Stage 3 IRP Survey at Mather AFB in Sacramento, California. The objective of this survey was to confirm and quantify the presence and extent of contamination at the 7100 Disposal Area, Air Command & Warning (ACW) Area Disposal Site, West Ditch and in the Northeast Perimeter of the base. These sites had been investigated in 1985 during a Phase II, Stage 1 Survey and additional work recommended for all four. During Stage 3, thirty-five groundwater monitoring wells were installed, using standard mud rotary techniques. Seventeen were drilled into the water table aquifer and 18 into the confined aquifer. Two rounds of groundwater samples were collected from 35 Stage 3 wells, 1 Stage 2 well, and 8 Stage 1 wells. One round of samples was collected from base production wells. A geophysical survey and a soil gas survey were also conducted at the ACW and 7100 sites.

Groundwater sampling showed that 14 wells contained one or more volatile organic compounds. Trichloroethylene (TCE) was the main contaminant and was found at the ACW, 7100 and West Ditch wells. No contaminants were found in upgradient wells along the Northeast Perimeter. Contaminants were found in 4 deep wells, but in 3 of those cases the contaminants are thought to be sampling or laboratory induced artifacts. Nine shallow wells were found to contain chemicals above the state action level; all of these wells are located directly upgradient from water supply wells or the base property line. Ten additional shallow wells are recommended to help define the sides and front edge of the plume at the ACW, 7100 Disposal Area and at the West Ditch. Additional sampling for volatile organics is required at existing contaminated wells and new wells.

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PREFACE

This report was prepared by AeroVironment Inc. under task order 12 of contract F33615-83-D-4000. This report is a summary of field activities, data, analysis, conclusions and recommendations prepared as part of the Phase II, Stage 3 IRP investigation of Mather AFB.

The project team primarily consisted of Mr. Douglas Taylor, Mr. Timothy O'Gara, Mr. Christopher Lovdahl, Mr. Kenneth Napp, Mr. David Herrera, Ms. Sandra Eccker and Ms. Sheryl Thurston of AeroVironment Inc. Mr. Taylor served as project manager, Mr. O'Gara and Mr. Napp served as field geologists, Mr. Lovdahl and Ms. Eccker provided laboratory coordination, and Ms. Thurston and Mr. Herrera assisted with drilling and sampling.

AeroVironment wishes to acknowledge the assistance of Mather AFB *personnel, particularly* Capt. James Curran, and MSgt. Patricia Sparks of the Bioenvironmental Engineering office. Also, the Phase I report prepared by CH2M Hill, the Phase II, Stage 1 report prepared by Roy F. Weston, and the Phase II, Stage 2 report prepared by AeroVironment were used as information sources throughout this project.

This work was accomplished between July 1986 and March 1987. Capt. Brian D. McCarty, Technical Services Division, USAF Occupational Environmental Health Laboratory (USAFOEHL) was the technical monitor.

Approved:

Ivar H. Tombach
Vice President, Environmental Programs Division

Krish Krishnan
Project Manager

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TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

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LIST OF FIGURES

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LIST OF TABLES

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EXECUTIVE SUMMARY

The United States Air Force has developed the Installation Restoration Program to assess the environmental effects of past hazardous material handling and disposal activities. As part of that program, the Air Force assigned Task Order Number 12 to AeroVironment Inc., under contract F33615-83-D-4000, to conduct a Phase II, Stage 3 study of Mather AFB, California. Mather is located about 15 miles east of downtown Sacramento, in Rancho Cordova, California.

A Phase II study, using a staged approach, is intended to confirm the information reported in the Phase I report (a record search) and to quantify the presence and extent of contamination that may be present. In 1984, Roy F. Weston Inc. completed a Phase II, Stage 1 study of the three most serious sites at Mather AFB:

- Site No. 7, 7100 Disposal Area
- Site No. 12, Air Command & Warning (ACW)
- Site No. 15, West Ditch

The Stage 1 report recommended that the sites be investigated further to fully define the groundwater contamination that had been either confirmed or suspected at each site. AeroVironment conducted the Stage 3 effort (a Stage 2 study was conducted on other sites in 1985) to define the contamination at these sites in three dimensions. Upgradient (background) conditions along the Northeast Perimeter of the base were also investigated.

History of Sites

The 7100 Disposal Area is located in the southwestern section of the base, south of the now-abandoned sewage treatment plant. The site was originally a borrow pit, excavated in 1953 to a depth of 40 feet. From 1953 to 1966,

the site was a major disposal area for POL wastes from the industrial shops, which may have contained TCE. Disposal of industrial wastes (except POL) continued through 1975. Since 1975, construction rubble has been disposed of in this area.

The Air Command and Warning (ACW) Disposal Area is located northeast of base housing and southeast of the SAC alert apron. From 1960 until 1966 it was reportedly common practice for personnel at the ACW radar site to dispose of waste solvents and oils into a waste disposal pipe located about 100 feet southwest of the ACW production well. The Phase I report estimated that 1350 gallons of TCE and 1225 gallons of waste transformer oil had been disposed of in the pipe from 1960 to 1966.

The West Ditch flows from north to south along the western edge of the base. This unlined drainage ditch receives storm drainage from the entire main base, including the ATC and SAC shop areas. A skimmer was installed along the ditch in 1967. In the past, waste oils and solvents were reportedly dumped directly into the skimmer, which overflowed into the ditch. These wastes may have included TCE.

The Northeast Perimeter of Mather AFB is upgradient relative to the natural regional groundwater flow. Contamination carried in groundwater onto Mather AFB from adjacent properties would probably enter the base from this direction.

Testing Conducted

In particular, AeroVironment drilled, installed and sampled 36 groundwater monitoring wells at the three sites plus the Northeast Perimeter. Wells were drilled into two aquifers, the water table aquifer and the first confined aquifer. At the ACW Site and 7100 Area, AV conducted a soil gas survey to try to detect TCE in the surface soil or in a plume in the groundwater. Geophysical surveys were conducted at the ACW site and 7100 area.

AeroVironment and its geophysical and soil gas subcontractors performed testing at the 7100 Disposal Area and the ACW Disposal site during August and September of 1986. Drilling began in August 14, 1986, and was completed on October 12, 1986. At least one AeroVironment geologist was on site during all drilling activities.

Two complete sets of groundwater samples were collected from each of the 35 wells installed in this program, plus 1 well from Stage 2 and 8 wells from Stage 1. One round of sampling was collected from 10 base production wells. The samples were collected in November and December 1986. The December sampling also included all functional base production wells. Table ES-1 summarizes the work completed during this project.

Summary of Results

Soil gas testing and geophysical surveys at the ACW Disposal Site identified neither a suspect source location nor a contaminant plume. As a result, well locations were selected based on groundwater gradients only.

Geophysical surveys at the 7100 Disposal Area indicated a possible plume of inorganic contamination in the shallow groundwater, so downgradient wells were located to monitor conditions along the suspected leading edge of the plume. The limited soil gas survey southwest of this site did not identify any shallow soil contamination. Groundwater flow at both locations is from northeast to southwest.

Water samples were analyzed for the parameters shown in Table ES-1. Ten volatile organic compounds were identified in the samples. The most prevalent, trichloroethene (TCE), was found in nine of the wells at concentrations that exceed the California Department of Health Services (DOHS) Action Level. Tetrachloroethene (also known as perchloroethylene, PCE), benzene, vinyl chloride, 1,2-dichloroethane and 1,4-dichlorobenzene were also found at levels that exceed the action level. Xylene was also found at significant levels in one sample, but not above action levels. Significant concentrations are those that were repeated in both sample sets and that occurred in concentrations greater than the limit of quantitation (LOQ) which is defined as five times the method detection limit. The

TABLE ES-1. Mather AFB Phase II, Stage 3 Work Summary

Site	Stage 3 Drilling	Stage 3 Sampling	Stage 3 Additional Work	Previous Stage 1 Activity
ACW Disposal Site (1960-1966)	Drilled and installed 11 groundwater monitoring wells; 5 shallow and 6 deep	Sampled 14 wells twice (11 Stage 3, 3 Stage 1) Analyzed for VOCs, ions, and minerals	Conducted a magnetometer and ground penetrating radar survey to locate the disposal pipe Conducted a soil gas survey to help define the extent of the TCE plume at this site	3 shallow wells
7100 Disposal Area (1953-1975)	Drilled and installed 12 groundwater monitoring wells[1]; 7 shallow and 5 deep	Sampled 15 wells twice (12 Stage 3, 3 Stage 1) Analyzed for: VOCs, ions, minerals, metals, and cyanide	Conducted an electrical conductivity survey to help define plume of contaminated groundwater	3 shallow wells
West Ditch Area (1967-?)	Drilled and installed 7 groundwater monitoring wells[2]; 3 shallow and 4 deep	Sampled 9 wells twice (7 Stage 3, 2 Stage 1) Analyzed for: VOCs, ions, and minerals		2 shallow wells
Northeast Perimeter	Drilled and installed 5 groundwater monitoring wells; 2 shallow and 3 deep*	Sampled 6 wells twice (5 Stage 3, 1 Stage 2) Analyzed for VOCs, ions, and minerals		3 shallow wells
Base Production Wells		Sampled 10 wells once Analyzed for VOCs, ions, and minerals		

*A third shallow well was drilled as part of Stage 2, but was sampled and reported as part of Stage 3.

[1]One shallow and one deep well (wells 46 and 59) listed for this area were installed near the Jet Engine Test Cell.

[2]One shallow well listed for this area was installed upgradient near the commissary.

exception to this definition is made when a sample has been found over the DOHS action level. If that occurs, the result is considered significant even if it is not repeatable or over the LOQ.

Ten shallow and five deep wells were sampled at the 7100 disposal area. Five of the downgradient shallow monitoring wells contained significant concentrations of volatile organics, particularly TCE. Three of the aforementioned wells with significant contamination of volatile organics are located off base property in and around the gravel pits west of the site. In fact, the off-base wells, which are located about 1000 ft downgradient from the site, had higher concentrations of organics than on-base wells located at the edge of the site. This indicates that the current set of downgradient wells was not near the leading edge of the contaminant plume. There appeared to be no spread of contamination into the second aquifer. All three upgradient wells were free of contamination.

Eight shallow wells and six deep wells were sampled at the ACW area. Four of the downgradient shallow monitoring wells were found to contain significant concentrations of TCE. The three Stage 1 wells, which are located near the suspected source, contained 23 to 790 µg/L of TCE (the DOHS action level is 5 µg/L). These results were higher than those from the 1985 study. One shallow well 2000 ft downgradient from the site contained about 5 µg/L, a 5 to 150-fold decrease in concentration. This indicates that the leading edge of the plume was probably not much further than 2000 ft from the site. There was no indication that the TCE contamination in the first aquifer was migrating downward into the second aquifer. Base production wells located downgradient from the site (in the base housing area) were free of TCE. Both upgradient wells were also free of contamination.

Five shallow wells and four deep wells were sampled at the West Ditch. One of the shallow wells located adjacent to the skimmer at the south end of the ditch contained significant levels of TCE and PCE. The northernmost deep well also contained significant levels of TCE and PCE. Concentrations from this deep well were repeatable between sampling rounds and are considered reliable. These results appear unrelated, since the wells adjacent to these contaminated wells

do not show evidence of TCE or PCE. No directly upgradient wells exist and only off-base domestic wells exist downgradient. As a result, insufficient information has yet been gathered about the extent of contamination, only that it exists.

None of the six wells sampled along the Northeast Perimeter contained any evidence of contamination.

The base production wells were also free of contamination, with the exception of the inactive ACW well (which was known to be contaminated) and HW-01, which showed a low level of 1,2-dichloroethane. Because only one round of samples was collected from production wells, the result of HW-01 could not be confirmed. Since Air Force sampling has never identified this compound in HW-01 before, and since split samples collected by the Mather Bioenvironmental Engineer at the time of the AV sampling showed no detectable 1,2-dichloroethane in HW-01, this result was believed to be a laboratory error.

Two deep wells at ACW contained significant concentrations of benzene and/or other aromatic compounds. However, since these results were not repeatable between rounds and were at very low concentrations, we suspect them to be laboratory or sampling error.

Generally speaking, the results of the Stage 3 sampling were comparable to those of Stage 1. The Stage 3 results confirmed the contamination previously identified or suspected and better defined the extent of plume migration at ACW and 7100.

Recommendations

Table ES-2 summarizes specific recommendations. No problems exist along the Northeast Perimeter and only continued monitoring is necessary in that area of the base. Three additional shallow wells are needed downgradient (off base) from the existing well network at both the 7100 Disposal Area and the ACW Disposal Site to determine the downstream extent of contamination. At the West Ditch, three downgradient and one upgradient shallow wells are needed to define the extent of movement. In addition, extensive research should be conducted on domestic wells along Happy Lane which have reportedly been contaminated with TCE.

TABLE ES-2. Summary of recommendations.

Site	Recommendation
Northeast Perimeter (Category II)*	- Continue monitoring upgradient conditions by sampling the 6 existing wells semiannually and test for VOAs (Method 601). - Abandon monitoring Well MAFB-5.
No. 7, 7100 Disposal Area (Category II)	- Install 3 additional groundwater monitoring wells, each in the water table aquifer and each downgradient from the existing wells (the new wells would be off base). - Sample the 15 existing wells plus the 3 new ones semiannually and test for VOAs (Methods 601 and 602), metals and minerals (Method 200).
No. 12, ACW Disposal Site (Category II)	- Install 3 additional groundwater monitoring wells, each in the water table aquifer and each downgradient from the existing wells. - Sample the 14 existing wells plus the 3 new ones semiannually and test for VOAs (Method 601). In addition, test samples from deep wells for Method 602 compounds at least once more.
No. 15, West Ditch (Category II)	- Install 4 additional groundwater monitoring wells, each in the water table aquifer. One well would be located upgradient of the west ditch skimmer and 3 would be downgradient (off base), west of Happy Lane. - Sample the 9 existing wells plus the four new ones semiannually and test for VOAs (Method 601/602). - Research all private wells within 1.0 mile of the site.

*Category II is defined on Page VI-1.

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I. INTRODUCTION

A. Purpose of the Program

The United States Air Force (USAF) has developed the Installation Restoration Program (IRP) to identify and evaluate environmental contamination from past handling and disposal of hazardous materials at Air Force bases throughout the United States. AeroVironment Inc. (AV) was retained by the U.S. Air Force Occupational and Environmental Health Laboratory (USAFOEHL) to provide consulting services for the IRP under Contract F33615-83-D-4000. Under that contract, AV was tasked to conduct a Phase II, Stage 3 investigation of Mather AFB, California, for Headquarters Air Training Command (HQ ATC).

In the Phase I record search, CH2M Hill identified 23 sites at Mather AFB as possible or known hazardous waste disposal sites. Of these 23 sites, 20 were ranked using the hazard assessment rating methodology (HARM). The Phase I report recommended that the three highest ranked sites be investigated further in Phase II, Stage 1 (CH2M Hill, 1982). They are, in order of decreasing order of HARM ranking:

Site 7	7100 Disposal Area
Site 12	Air Command and Warning (ACW) Disposal Site
Site 15	West Ditch (Drainage Ditch No. 3)

In addition, the Northeast Perimeter of Mather AFB was to be studied to determine upgradient conditions.

The Phase II, Stage 1 survey was conducted in 1984 by Roy F. Weston Inc. The results of the Stage 1 sampling showed that groundwater contamination exists or may exist at all three sites. Weston recommended further study at each site to define the extent of the problem.

During the Phase II, Stage 1 survey, HQ ATC decided that in addition to the 3 sites being investigated by Weston, 15 of the remaining 17 HARM-ranked

sites should also be investigated. AV studied these sites under a Phase II, Stage 2 survey in 1985/1986.

In accordance with the recommendation by Weston, AV conducted a Phase II, Stage 3 investigation of the 3 sites studied under Stage 1 and of the Northeast Perimeter as well. The objectives stated in the task order were:

(1) To determine the presence or absence of contamination within the specified areas of investigation.

(2) If contamination exists, to determine the potential for the contaminants to migrate through the various environmental media.

(3) To identify additional investigations necessary to determine the magnitude, extent, direction and rate of migration of discovered contaminants.

(4) To identify potential environmental consequences and health risks of migrating pollutants.

To meet these objectives, AV installed and sampled 35* groundwater monitoring wells at the 4 sites. At two of the sites, AV conducted an electromagnetic profiling survey to explore for conductive subsurface zones that might be associated with contaminant migration. In additional surveys using ground-penetrating radar, magnetometer and pipe locator, we attempted to locate a buried pipe used for halogenated solvent disposal at the ACW site. In addition, a shallow soil gas survey at two of the sites delineated the distribution of solvents in the subsurface. Table I-1 summarizes the work performed at each of these sites.

*One additional well was drilled with funds from another task order, but will be discussed in this report because it is part of the Northeast Perimeter monitoring system.

Table I-1. Mather AFB Phase II, Stage 3 Work Summary

Site	Stage 3 Drilling	Stage 3 Sampling	Stage 3 Additional Work	Previous Stage 1 Activity
ACW Disposal Site (1960-1966)	Drilled and installed 11 groundwater monitoring wells; 5 shallow and 6 deep	Sampled 14 wells twice (11 Stage 3, 3 Stage 1) Analyzed for VOCs, ions, and minerals	Conducted a magnetometer and ground penetrating radar survey to locate the disposal pipe Conducted a soil gas survey to help define the extent of the TCE plume at this site	3 shallow wells
7100 Disposal Area (1953-1966)	Drilled and installed 12 groundwater monitoring wells[1]; 7 shallow and 5 deep	Sampled 15 wells twice (12 Stage 3, 3 Stage 1) Analyzed for: VOCs, ions, minerals, metals, and cyanide	Conducted an electrical conductivity survey to help define plume of contaminated groundwater	3 shallow wells
West Ditch Area (1967-?)	Drilled and installed 7 groundwater monitoring wells[2]; 3 shallow and 4 deep	Sampled 9 wells twice (7 Stage 3, 2 Stage 1) Analyzed for: VOCs, ions, and minerals		2 shallow wells
Northest Perimeter	Drilled and installed 5 groundwater monitoring wells; 2 shallow and 3 deep*	Sampled 6 wells twice (5 Stage 3, 1 Stage 2) Analyzed for VOCs, ions, and minerals		3 shallow wells
Base Production Wells		Sampled 10 wells once Analyzed for VOCs, ions, and minerals		

*A third shallow well was drilled as part of Stage 2, but was sampled and reported as part of Stage 3.

[1]One shallow and one deep well (wells 46 and 59) listed for this area were installed near the Jet Engine Test Cell.

[2]One shallow well listed for this area was installed upgradient near the commissary.

AV completed the work specified in the project's statement of work (SOW) and accomplished the objectives to the maximum extent possible. All of the groundwater monitoring wells were installed and sampled; however, some of the base's production wells could not be sampled because the pumps were inoperative at the time of the sampling. Soil sampling was not undertaken because soil gas monitoring did not locate an area of contamination. The results of the sample analyses, which are discussed in Chapter IV, have helped us determine which sites at Mather AFB show evidence of contamination.

B. Duration of the Program

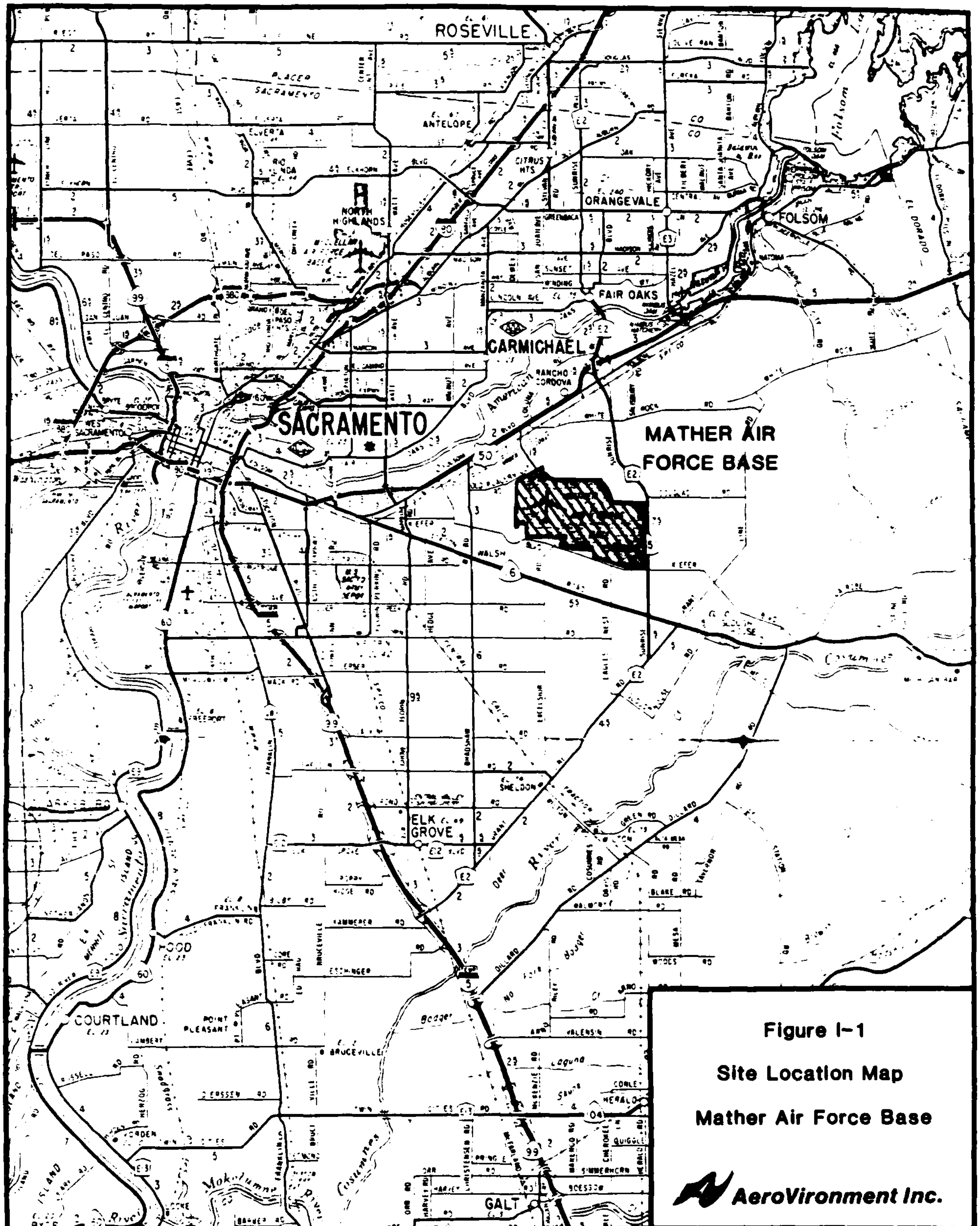
On August 15, 1986, AV received Task Order No. 12 of Contract F33615-83-D-4000 to conduct the Phase II, Stage 3 survey at Mather AFB (verbal authorization had been received on July 17, 1986).

AV negotiated a drilling subcontract and received bids for other subcontract items before the formal award of the contract. When we received verbal authorization from the Air Force, we formalized the subcontracts, submitted our safety plan to the California Department of Health Services, completed the Technical Operations Plan for USAFOEHL, and planned the logistics for beginning field work. Well drilling began on August 14, 1986, and ended on October 12, 1986. Geophysical surveys were conducted August 18-22, 1986. The soil gas survey was conducted September 2-6, 1986. Groundwater samples were collected at Mather AFB in two rounds: November 9-17, 1986 and December 8-14, 1986. The latter included base production wells.

All field work at Mather AFB was completed by December 14, 1986. All laboratory analyses were completed by January 23, 1987. Report preparation began after the well drilling ended. This document reports the findings, tasks and impact analysis of this investigation.

C. Base History

Mather Air Force Base (see Figures I-1 and I-2) was constructed in 1918 and served as a flight training school until June 1922 when it was inactivated. For



June 1986

Approximate Scale: 1" Equals 4 Miles
Reference: Sacramento Valley Region Map
California State Automobile Association

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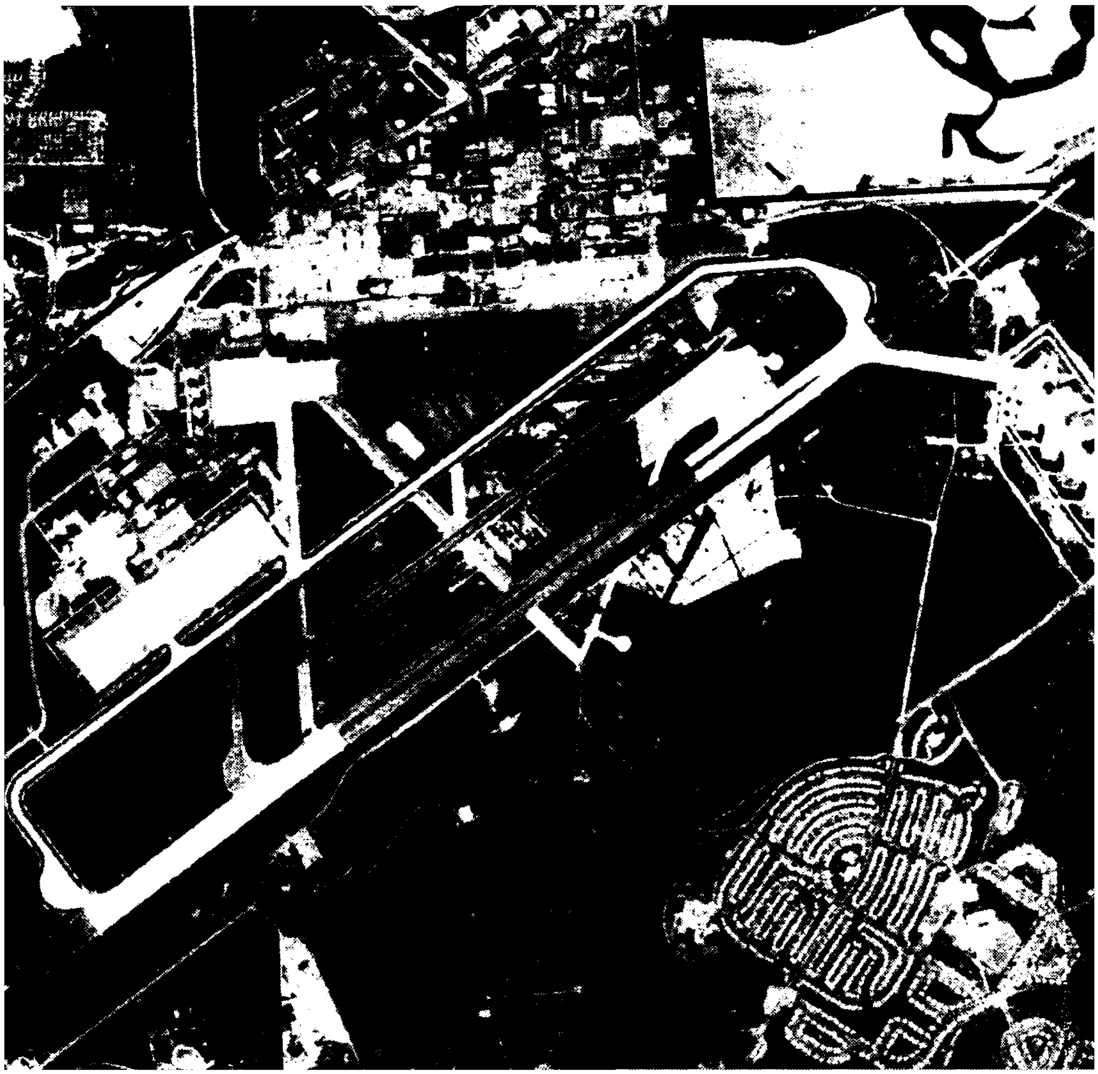

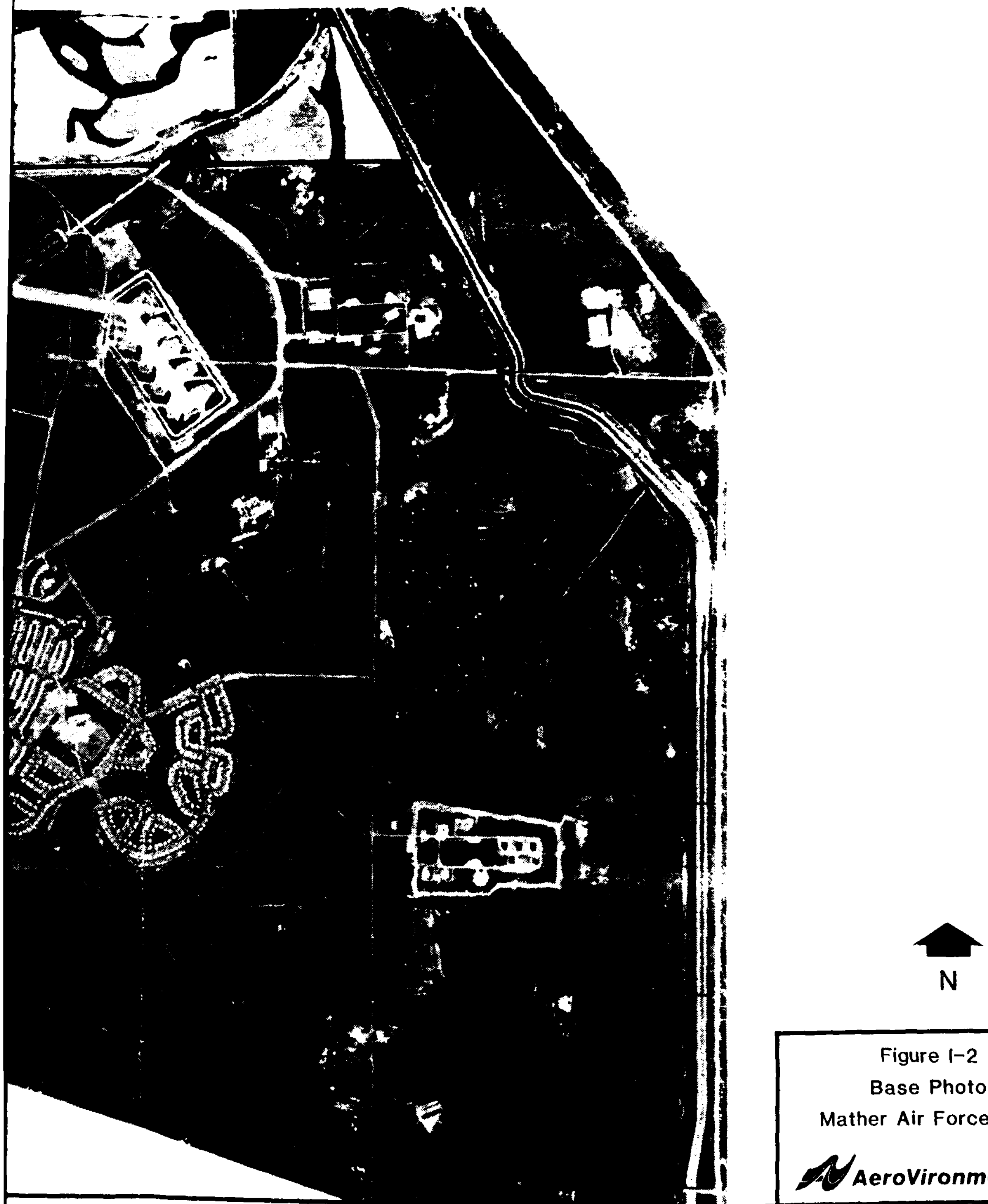

Figure I-2
Base Photo
Mather Air Force Base

AeroVironment Inc.

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a period between March 1930 and November 1932, Mather was reactivated, but it was not involved in continuous military activity until World War II, when it officially resumed its training mission. In 1945 a school was established for navigator-bombardiers. This school has since been expanded to train all services under the Department of Defense. In 1958, Strategic Air Command assigned the 4134th Strategic Wing to Mather as a tenant organization. This wing was replaced by the current tenant organization, the 320th Bombardment Wing, in February 1963.

A description of the sites AV investigated for possible contaminants follows. Most of the information presented in this section has been taken from the Phase I records search (CH2M Hill, 1982) and the Phase II, Stage 1 survey report (Weston, 1986). Figure I-3 shows the general location of these sites; the exact locations will be presented in Chapter 4.

- *7100 Disposal Area (Site 7)*

The 7100 Disposal Area is located in the southwestern section of the base, south of the now-abandoned sewage treatment plant (STP). It is bounded immediately to the north by the current (1958-1984) Fire Department Training Area (Site No. 11 in the Phase I report), to the east by the STP oxidation ponds, to the south and west by the base boundary.

The 7100 Area landfill was originally a borrow pit, excavated in 1953 for construction of the Strategic Air Command (SAC) area. The pit, originally about 40 feet deep, has been used since 1953 for waste disposal and has been completely filled with refuse.

The 7100 area was also known as the "nonburn dump" and the "construction rubble disposal site." It is currently used for disposal of inert construction rubble, but was reportedly used in the past for all types of wastes except household garbage, which was sent to the base sanitary landfills. From 1953 until about 1966, the landfill was a major disposal site for petroleum, oil and lubricant (POL) wastes, which were routinely transported from the industrial shops

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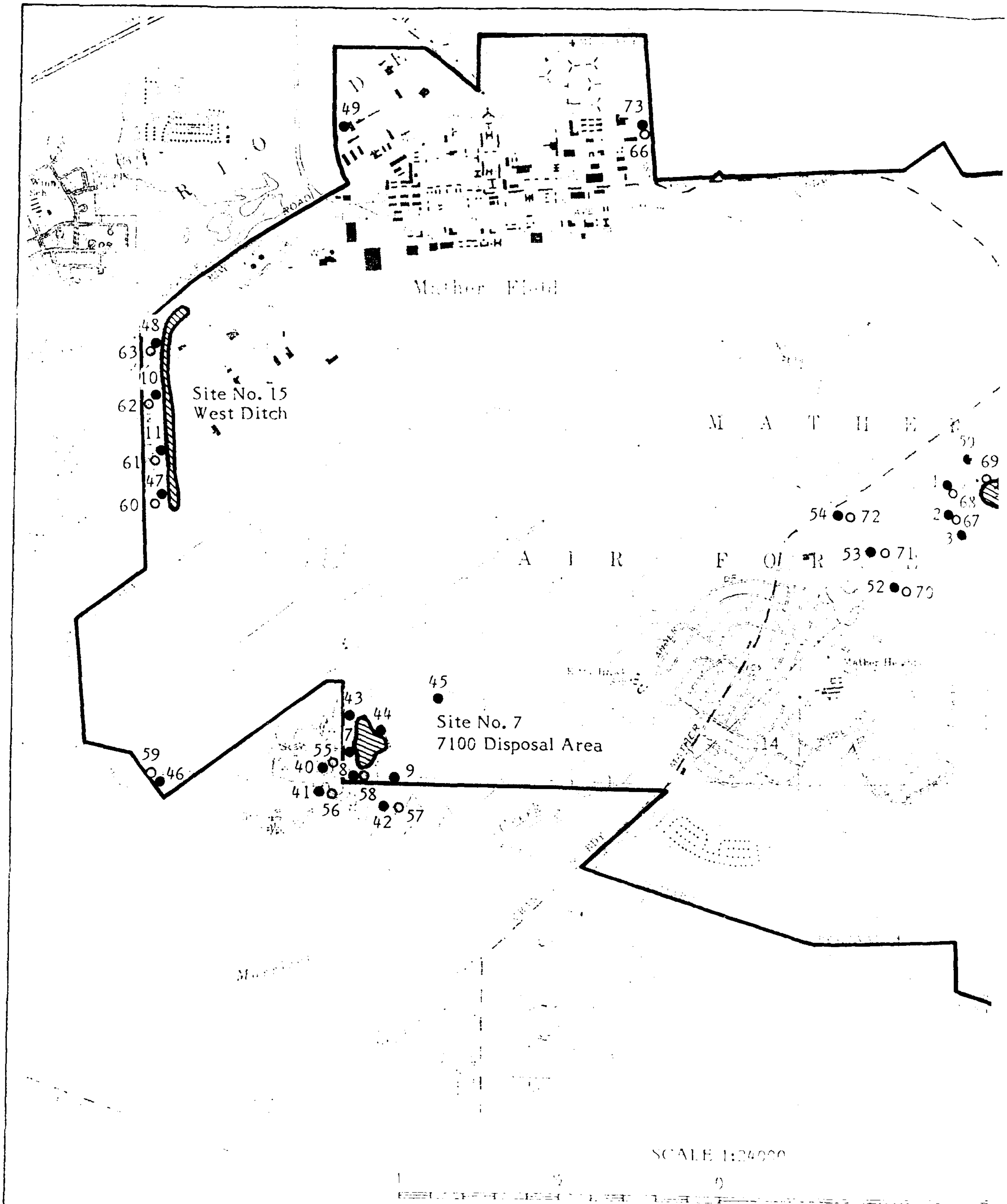

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66
ROAD
Mather Field
48
63
10
62
11
61
47
60
Site No. 15
West Ditch
M A T H E R
59
69
1
68
2
67
3
54
72
A I R
F O R
53
71
52
70
45
43
44
7
Site No. 7
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56
42
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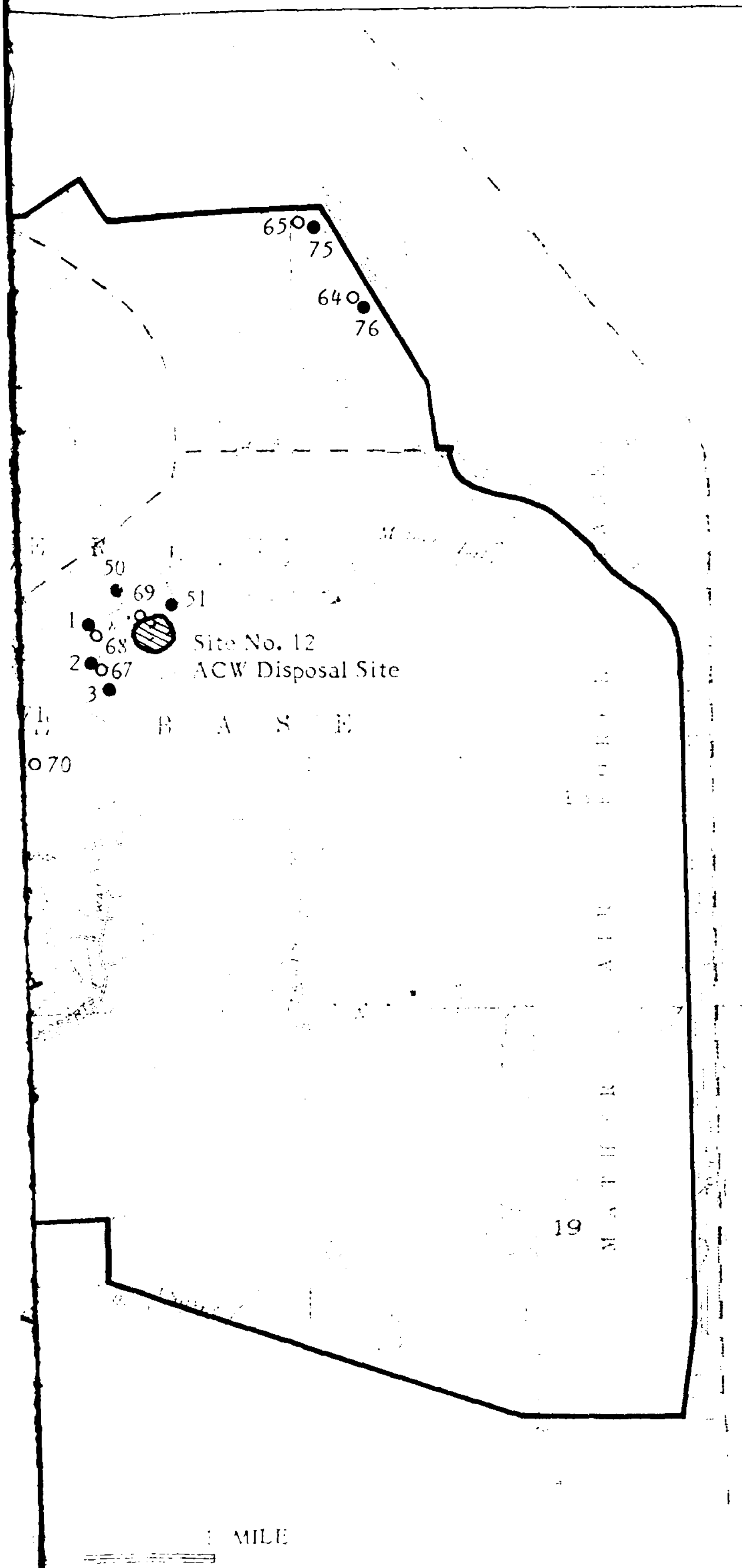

● Shallow groundwater monitoring well

o Deep groundwater monitoring well

IRP Sites

Note: Only Phase II, Stage 3 sites are shown.

Reference: USGS topo maps and USAF Master Plan for Mather AFB, 30 September 1983.

N

Figure I-3

Base Map

Mather Air Force Base

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to this site for disposal. Trichloroethylene (TCE) was in common use during most of this time and may also have been disposed of at this site. The practice was curtailed in 1966 when an oily seepage was observed leaching into an adjacent borrow pit, which is located off base to the west and is excavated to approximately 40 feet below grade. Other wastes reportedly dumped in this site include empty drums, sludge from the plating shop dip tanks (approximately 80 gallons per year until 1975), adsorbent sand used in cleaning up oil and solvent spills, paint chips, waste paints and thinners, and transformer oil that may have contained polychlorinated biphenyl (PCB) compounds (at least one instance of such dumping is known). Disposal of industrial wastes at this site was discontinued in 1975.

- ACW Disposal Site (Site 12)

The Air Command and Warning Disposal (ACW) site is located in the ACW area, between the alert apron and family housing. The site was constructed in the late 1950's as part of the Air Defense Command early warning system. The 668th ACW Squadron, which operated the site jointly with the Federal Aviation Administration (FAA), left Mather AFB in 1966. The FAA and SAC Security Police Headquarters currently occupy the site. From 1960 (and possibly before) until 1966, it was reportedly common practice for personnel at the ACW radar site to dispose of waste solvents and oils into a waste disposal pipe located approximately 100 feet southwest of the ACW well. One interviewee recalled disposing of waste (TCE), used for cleaning air intake filters and transformers, and transformer oil that may have contained PCBs. Other wastes reportedly disposed of include waste engine oils, carbon tetrachloride and antifreeze. CH2M-Hill estimated that approximately 1,350 gallons of TCE and 1,225 gallons of waste transformer oil were disposed of in the pipe between 1960 and 1966.

The pipe was described as about 10 inches in diameter with a removable cap. The base bioenvironmental engineering (BEE) staff collected soil samples in November 1979 to determine the exact location of the past disposal site and the extent of soil contamination. A backhoe was used to excavate an area approximately 30 feet long and 15 feet wide. Excavation depths ranged from 4 feet at the edges to a maximum of 6 feet at the center of the site. Seven soil

samples collected at 3- to 6-foot depths were analyzed for TCE and PCBs. However, the exact location of the pipe was not found.

- West Ditch (Site 15)

The West Ditch flows from north to south along the western base perimeter road and the base boundary, adjacent to and directly west of the SAC area. This unlined drainage ditch receives storm drainage from the entire main base, including the ATC and SAC shop areas.

After installation of an oil skimmer in 1967, it was reported that waste oils and solvents were dumped directly into the skimmer, which overflowed into the ditch. A past waste inventory indicated that about 30 drums of TCE were on hand in the SAC area. The wastes that overflowed into the ditch may have included some of this TCE. One of the interviewees indicated that, before the skimmer was installed, an underground tank had been located at this site for POL waste disposal and that this area was commonly referred to as the waste oil disposal site. This tank was evidently removed when the skimmer was installed.

This site may also have been subject to spills and dumping of POL waste on the ground and in the ditch. Also, since many of the floor drains in the shop areas were connected to the storm sewer system (which includes the West Ditch), waste oils and solvents from inside the shops (spills and cleaning) may have entering the West Ditch.

- Northeast Perimeter

The Northeast Perimeter of Mather AFB is upgradient relative to the natural regional groundwater flow direction. Contamination carried in groundwater to Mather AFB from adjacent properties would probably enter the base from this direction. Two major industrial properties are located northeast and east of the base. They manufacture and test rocket propellants and occupy thousands of acres. A portion of the property, approximately 5 miles upgradient

from the base, is known to have serious groundwater contamination (CH2M Hill, 1982). It is on the Superfund list and is being evaluated and remediated by the responsible party in cooperation with the California Department of Health Services (DOHS).

D. Identification of Laboratory Parameters

The primary purpose of the investigation at Mather AFB was to determine the presence or absence of contamination in the water table and first confined aquifer. AV also studied contamination in surface soils using soil gas monitoring at two sites. Since the Stage 1 report (Weston, 1986) indicated that volatile organic compounds were of concern at all three sites, all water samples were analyzed for them. In addition, all water samples were analyzed for common anions and minerals (including cations) to help determine whether water is mixing between aquifers. Samples collected from the 7100 Landfill site were analyzed for metals and cyanide as well, because of the plating baths disposed there. Table I-2 shows the analyses performed on samples from each site.

E. Identification of Field Team

The field investigation team AV assembled for the Phase II, Stage 3 study at Mather AFB included AV personnel, a drilling subcontractor and a geophysical subcontractor. The AeroVironment team included the following professionals, whose resumes are included in Appendix I.

Douglas Taylor, P.E., is a project manager in AV's Environmental Programs Division. He has an M. Engr. in environmental engineering and six years' experience in hazardous waste management and site assessments. He has managed numerous DoD, EPA, and private party site investigations and sampling programs. Mr. Taylor served as project manager for the Mather AFB study. In this capacity, he was the main interface between AV and USAFOEHL. He was responsible for the scheduling of field work (drilling and sampling), for the management of drilling and laboratory subcontractors, and for personnel staffing and technical review.

TABLE I-2. Analytical Requirements

Site(s)	Water Analyses* (method number)
No. 12 ACW Disposal Site No. 15 West Ditch Northeast Perimeter Base Production Wells	VOA (EPA 601/8020) Common Anions (SM429) Minerals (EPA 200.7) TDS (EPA 160.1) Alkalinity (SM 403)
No. 7 7100 Disposal Area	[illegible] EPA [illegible] 8020) [illegible] (SM429) [illegible] EPA 200.7) [illegible] [illegible] [illegible] **

*(EPA, 1979; EPA [illegible]

**Analyses [illegible]

VOA: Volatile organ[illegible]

TDS: Total Dissolved s[illegible]

Timothy O'Gara is the leader of AV's Earth Sciences Section. He holds a B.A. in earth science and has seven years' experience in groundwater monitoring and hazardous waste investigations. Mr. O'Gara has directed drilling, groundwater monitoring well installation and soil sampling programs at sites throughout California. He was responsible for directing the well-drilling program at Mather AFB. His duties during this project included coordinating with base personnel, selecting well locations, supervising the drilling crews, and reporting on hydrology.

Christopher Lovdahl, an environmental chemist, holds a B.S. in environmental science and has seven years' experience in environmental compliance, waste site sampling and analytical chemistry. He worked for four years at industrial facilities and analytical laboratories prior to his IRP involvement. Mr. Lovdahl was responsible for reviewing groundwater monitoring well sampling requirements and coordinating with the instrumental-analytical laboratories. He served as the point of contact between AV and the laboratory, instructing the laboratory on selected analytical methods and special sample handling. He also made quality assurance/quality control (QA/QC) reviews of all laboratory data.

Sandy Eccker, a Geochemist with a B.S. in chemistry and an M.S. in Geology, has five years' experience in soil gas surveys, soil sampling and laboratory analysis, assisted Mr. Lovdahl in groundwater sampling, data analysis and laboratory interface.

Kenneth Napp, a hydrogeologist with an M.S. in geology, has one year's experience in the oil and gas and environmental monitoring industry. Mr. Napp served as a field geologist during the well drilling program. He was responsible for logging the samples and designing groundwater monitoring wells. He also participated in drilling, crew supervision and reporting on hydrology and geology.

Sheryl Thurston, an environmental engineer with a B.S. in environmental engineering, has two years' experience with IRP programs and state RCRA recordkeeping. Ms. Thurston served as a field engineer during well drilling at Mather AFB. She assisted with driller supervision and lithologic sample logging.

David Herrera, an environmental scientist with a B.S. and one year of IRP experience, served the same functions as Ms. Thurston.

Beylik Drilling Inc. of La Habra, California, performed the drilling. Beylik has 40 years' experience in drilling water production and monitoring wells at locations throughout California. The company and many of its personnel have specific experience drilling in the Sacramento area (including Mather AFB) and working on IRP programs at USAF bases. Beylik provided an Ingersoll Rand TH 100 mud rotary drilling rig and support equipment. Beylik drilled, constructed and developed all 36 groundwater monitoring wells under the direction of AeroVironment field personnel.

Earth Technology Corporation of Long Beach, California, conducted geophysical surveys on two sites at Mather AFB. Earth Technology is a geotechnical consulting firm with over nine years' experience in geophysical investigations. The surveys were conducted by Mr. Brian Bazzett under the direction of Mr. O'Gara of AV.

Tracer Research Corporation of Tucson, Arizona, conducted the soil gas surveys. Tracer, and its founder Dr. Glenn Thompson, is a pioneer in the use of soil gas surveys at hazardous waste sites and contaminant spill locations. The field work was conducted by Ken Tolman (chemist) and Marshall Krotenberg (geologist) under the supervision of Mr. Lovdahl of AV.

Acurex Corporation of Mountain View, California, performed the laboratory work. Acurex's Energy and Environmental Division joined with AeroVironment as part of the contract team for USAFOEHL. Mr. Greg Nichol (M.S., Chemistry, nine years' laboratory management experience) served as program coordinator for the Acurex effort on this task.

II. ENVIRONMENTAL SETTING

A. Physical Geography

Mather AFB is located approximately 15 miles east of Sacramento, California, and one mile southeast of the American River, in the American Basin. The basin is a broad, shallow trough surrounded by natural levees and low alluvial plains and fans. It is a flat, poorly-drained land that has received flood waters when the natural levees have overflowed.

The American Basin, with the Yolo Basin and the alluvial plains of the Sacramento River, helps to form the Sacramento Valley. This valley joins the San Joaquin River Valley to constitute the Great Valley Physiographic Province that extends south from Red Bluff, California, north from Bakersfield, California, and averages a width of 40 miles (USGS, 1979).

Tailings from a surface gold dredging operation cover the area surrounding Mather AFB to the north, northwest and west, but not the area of the base itself. This gold mining operation excavated the upper 20 to 30 feet of sediment and redeposited the gravel and cobbles as tailings (CDMG, 1975). Thus, the surface soils in this area have a high permeability.

1. Topography

Mather AFB sits on a flat alluvial plain. Elevations range from 170 feet above mean sea level (msl) on the east side to approximately 70 feet above msl on the west side. The base has relatively low relief so that runoff rates are low. This affects infiltration rates in that rainwater is retained longer.

2. Soils

Soils at Mather AFB consist mostly of gravelly or sandy loam to a depth of about five feet. Most of the base is mantled by Corning Gravelly Loam, undulating Perkins Gravelly Loam, or Redding Gravelly Loam. These soil types

have a relatively low permeability with infiltration rates of 10^{-5} to 10^{-6} cm/sec. The only difference among these three types lies in their elevation and relief. The Corning soils occur at the highest elevation of the three. They consist of a red-brown gravelly loam that grades to a clay layer at about 3 feet below land surface (bls). Clay and gravel are prominent in the 3- to 5-foot layer. The Perkins soils consist of a brown or light brown gravelly loam that grades to a red-brown gravelly, heavy clay at approximately 3 feet bls. The Redding soils consist of a red-brown gravelly loam that grades to gravelly clay at about 3 feet bls. Upper soils are generally permeable down to the clay layer, which is fairly impermeable. This layer must be penetrated in order for any significant pathway for groundwater contamination to exist.

B. Regional Geology

The Sacramento Valley is a deep structural trough bounded on the east and west by metamorphic and crystalline bedrock. The basement rocks occur at shallow depths at the edge of the basin but at great depths in the center. A thick sedimentary sequence overlies the basement rocks and ranges in age and type from Cretaceous marine to Recent alluvial deposits. The oldest sediments occur as a thick sequence of Cretaceous and Eocene marine and continental deposits that contain either saline, brackish or no water (CDWR, 1964). These rocks are impervious and therefore of little interest in this study. A generalized geological map of the area is found in Figure II-3

At Mather, the upper 600 feet of unconsolidated gravel, sand and clay are the interval of interest. These sediments range in age from Pliocene to Pleistocene and are divided into four distinct formations (CDWR, 1978):

- The Victor Formation comprises interbedded sand, silt and clay. Generally, a hardpan layer lies within 10 feet of the ground surface. The distribution of Victor sediments at Mather Air Force Base is patchy, occurring mostly on the west side of the base.

- The South Fork Gravel consists of thick intervals (10 to 50 feet) of unconsolidated gravel and well-rounded cobbles. Beds of coarse sand or interbedded sand and silt overlie and underlie the coarse gravel and cobble members.

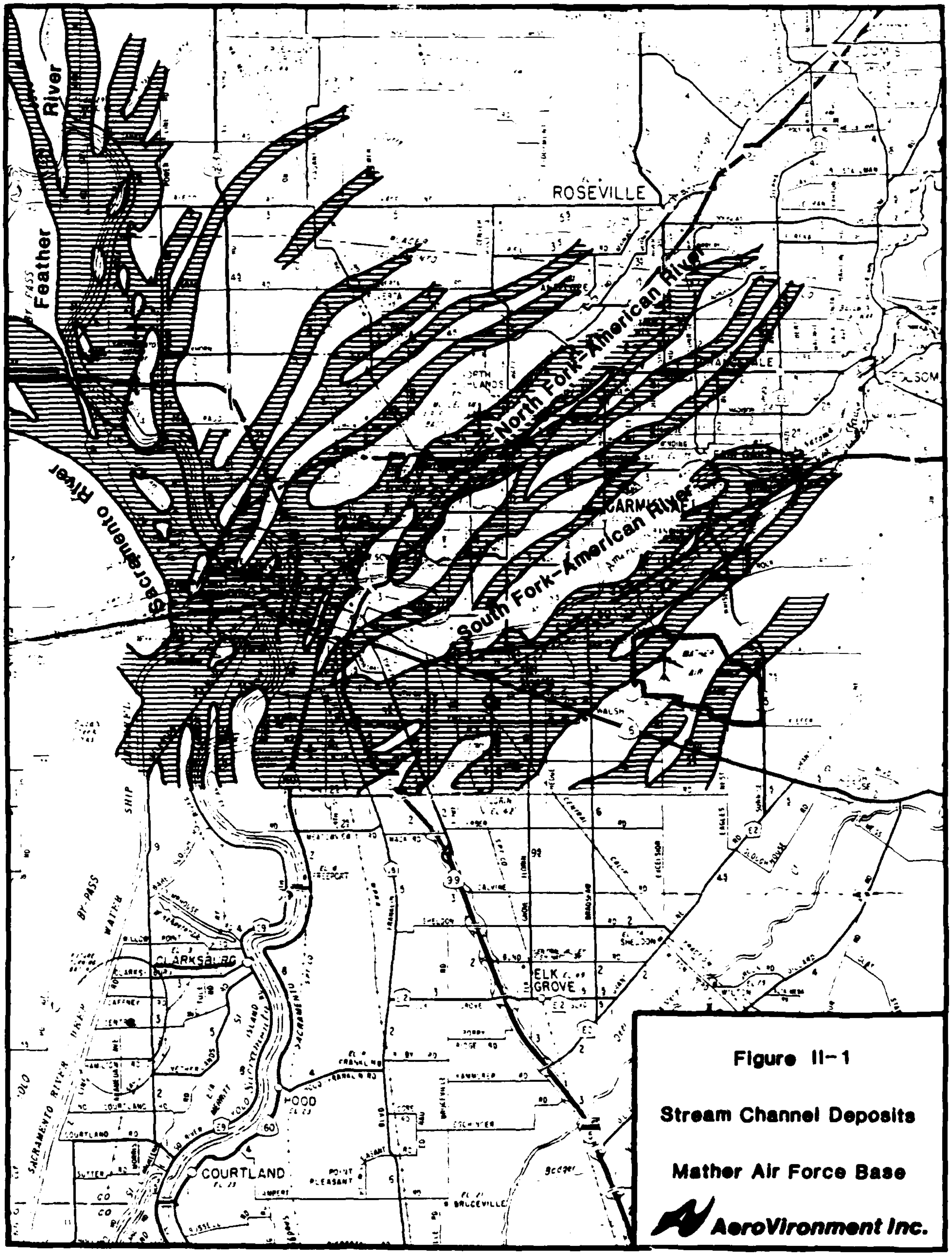
- The Laguna Formation consists of layers of clay and silt with occasional beds of sand and, rarely, gravel. Sands and gravels occur as buried stream channels that are, in general, not laterally extensive.

- The Laguna-Mehrten transition zone is marked by a pronounced change from the fine-grained sediments of the Laguna Formation to underlying sand and occasional gravel beds. For simplicity, the Laguna-Mehrten transition zone and underlying sediments will be referred to as the Mehrten Formation. Lithologies encountered include 20-foot-thick vertically-stacked cycles that grade from a basal gravel to a sand and finally to fine-grained material (silt and clay) (CVRWQCB, 1980).

C. General Hydrogeology

In the Mather AFB area, groundwater occurs in the post-Eocene continental deposits (<34 million years old) beneath the Sacramento Valley. Most groundwater is stored and flows through sands or sands and gravels that were deposited in the past by streams (CDWR, 1978).

The buried stream channels of the American River create superjacent deposits and are significant in affecting horizontal contaminant migration (see Figure II-1). From all indications, the superjacent deposits of the American River lie above the regional water table surface, with the exception of the perched water table condition at the 7100 Disposal Area. Horizontal contaminant transport in this unsaturated interval is doubtful. Vertical migration of contaminants from sources overlying these deposits is enhanced; however, lateral migration in this zone lacks the mechanism for transport. (EPA)



87-116

Approximate Scale: 1" equals 4 miles

June 1986

Reference: CH2M Hill, Phase 1, IRP Report 1984.

The upper 600 feet of unconsolidated gravels, sands, silts and clays at Mather AFB are significant to water supply and pollution migration. Below the soil layer the strata become more permeable. In areas where the clay layer under the surface soil has been breached, infiltration into underlying strata may be very high. Alternating layers of sand, silt and clay of varying permeability separate the surface layers and the production zone for water supply wells. (See the lithological logs for base water supply wells in Appendix D.) This zone usually occurs at approximately 100 to 150 feet bls. The percolation rate to this zone is relatively higher in those areas where upper strata are predominantly sand and silt, rather than clay.

The most significant source of recharge in this region is infiltration through stream channels, particularly the American River. In those areas where the soil is sufficiently permeable, irrigation and rainfall can be an important source of recharge as well (Weston, 1986). The Victor Formation contains a well-defined hardpan layer within 10 feet of the ground surface (CDWR, 1978). Low permeability layers in the soil mantle, coupled with the Victor hardpan, severely restrict downward movement of water. However, in certain areas the low permeability layer has been breached (by landfill trenches, sewer lines, drainage ditches) and recharge is more likely along these pathways.

Under natural conditions (when no water was being pumped), groundwater in the Mather AFB area moved from a potentiometric high near Folsom, southwest toward the Sacramento River and turned south (CDWR, 1964). However, groundwater is discharged from the Mather AFB area primarily by pumping. These groundwater withdrawals have influenced local hydrogeology so that the Sacramento and American Rivers are now a point of groundwater recharge rather than discharge, as it was before pumping. Also, the cone of depression caused by irrigation in the Elk Grove area (south and southwest of the base) influences groundwater flow at Mather AFB. While it probably does not affect the direction of regional flow, it can be directly linked to local variations in the flow path (CDWR, 1978).

Before pumping began in the Mather AFB area, groundwater in the western portion stood at approximately 60 feet above msl (30 feet bls). As of

Spring 1982, the level had receded to 10 feet above msl; a 50-foot decline in 70 years (Weston, 1986). The effects of the decline in ground water levels is regional, and results from increased well pumping for domestic and agricultural uses.

Water supply wells at Mather AFB draw water from unconsolidated gravel and sand intervals between 150 and 600 feet (bgs). Many of these water bearing zones lie below our maximum depth of investigation which was 280 feet (bgs).

D. Location of Wells

Mather AFB has 15 pumping wells that make up six water supply systems (see Table II-1). The two golf course wells are used solely for irrigation, while the jet engine test cell well is used for fire protection and washwater for jet engine testing. The AC&W well was used for fire protection but is no longer used for any purpose. The remaining eleven production wells provide the base's general water supply. The locations of base wells are shown on Figure II-2.

In general, the main base wells produce water of good quality. Based upon extensive data collected by Mather Bioenvironmental Engineering (B.E.E.) personnel since 1983, TCE contamination has not been found in any of the active base production wells, except for trace quantities (below method detection limit). Trihalomethanes (THMs), especially chloroform, have been detected at low levels in several base production wells. THMs are common byproducts of drinking water disinfection. In March 1985, 1,2-Dichloroethane was detected above the DOHS action level (up to 3.7 μg/l) in four wells -- MB-3, MB-4, Housing well No. 3, and the K-9 well. Since this was the only sampling event for the time period 1983-1986 in which this compound was detected, these results are suspect. Currently, base drinking water wells are sampled quarterly by the Mather B.E.E. for volatile halogenated organic compounds (EPA Method 601) to ensure contamination is detected if it occurs. Table II-2 shows this current data; complete results are found in Appendix P.

Numerous irrigation and domestic water supply wells are located within two miles of the installation boundaries. Information available on these wells is

TABLE II-1. Base Well Data[a].

Location	No. of Wells	Well Depth (ft)	Perforation Depth (ft)	Avg. Well Capacity (million gals/day)	Treatment
Main Base[b]	4	500-584	186-517	0.9-1.9	Chlorination
Family Housing[b]	6	400-570	205-570	1.2-3.2	Iron & Manganese Removal, Chlorination & Flouridation
Golf Course[c]	2	403-462	No Data	1.4	None
ACW[d]	1	250	198-244	0.65	None
K-9 SAC Ordnance)[b]	1	250	No Data	0.072	Chlorination
Jet Engine Test Cell[e]	1	201	39-200	0.57	Chlorination

[a]Table obtained from Installation Restoration Program Records Search, p. IV-55.
[b]Denotes drinking water well system
[c]Denotes irrigation well system
[d]Not used for any purpose
[e]Fire protection well/water wash

87-124

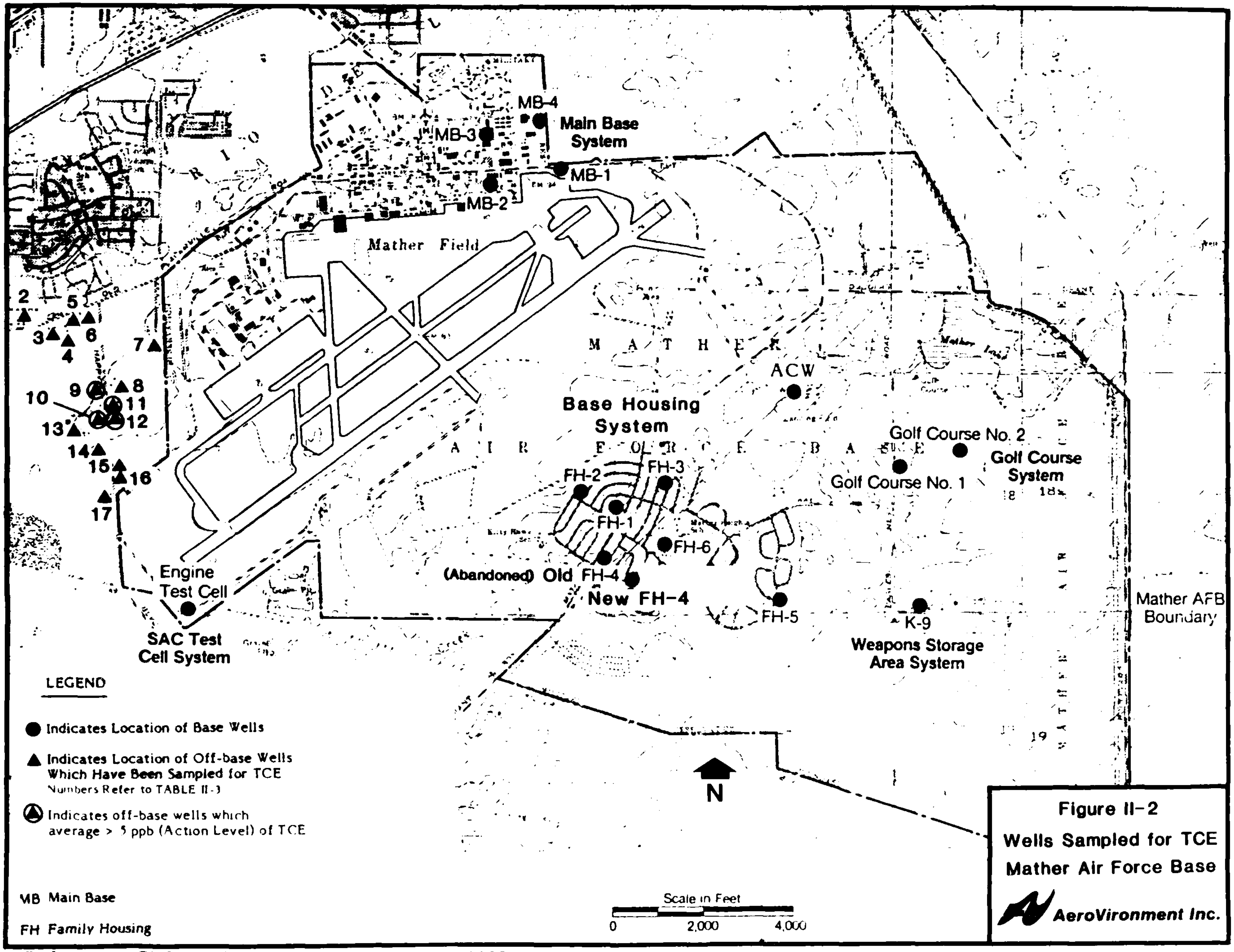


Figure II-2
Wells Sampled for TCE
Mather Air Force Base

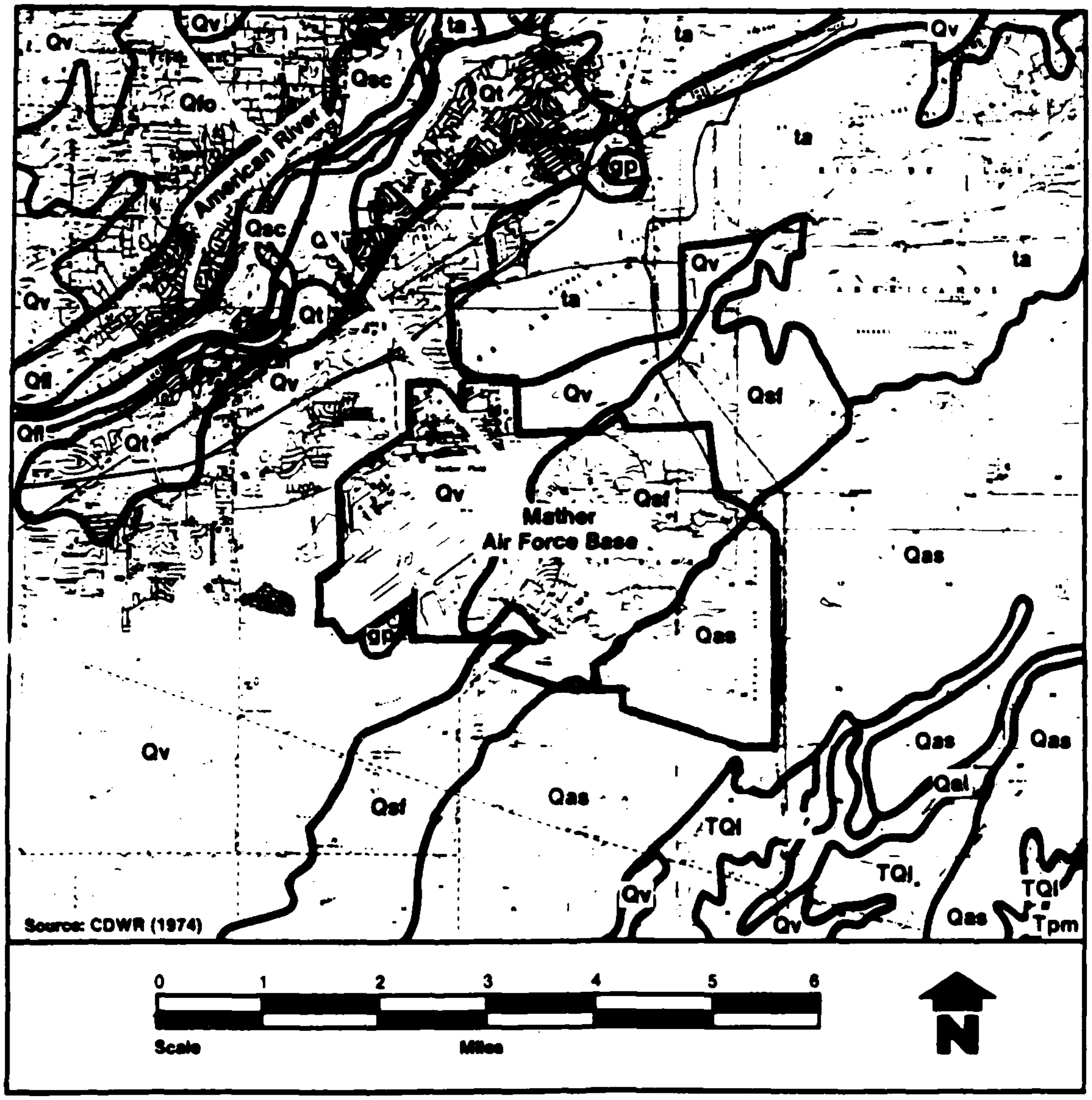
Reference: CH2M Hill Phase I IRP Report, June 1982.

TABLE II-2. TCE Sampling Results at Mather AFB[a].

Well	Maximum Measurement of 21 Samplings (ppb)
Main Base No. 2	ND[b]
Main Base No. 3	ND
Main Base No. 4	ND
Housing No. 1	ND
Housing No. 2	ND
Housing No. 3	ND
Housing No. 4	ND
Housing No. 5	ND
Housing No. 6	ND
K-9 Well	ND

[a]All analyses performed by USAF OEHL, Brooks AFB, TX. Thirteen samplings over a three-year period (6/83-9/86). Data obtained from Mather Bioenvironmental Engineering.

[b]ND = none detected.



LEGEND

Age		Symbol	Formation Name
Quaternary	Holocene	gp	Gravel Pits
		ta	Gold-Dredge Tailings
		Qsc	Stream Channel Deposits
		Qfl	Flood Plain Deposits
		Qal	Valley Alluvium
	Pleistocene	Qv	Victor Formation
		Qsf	South Fork Gravels
		Qas	Arroyo Seco Gravels
		Qfo	Fair Oaks Formation
Tertiary	Pliocene	TQl	Laguna Formation
		Tpm	Mehrten Formation

Figure II-3

Generalized Geologic Map of Mather AFB and Vicinity

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limited to the wells which have been tested by Central Valley Regional Water Quality Control Board personnel. The location of these wells and base wells can be seen in Figure II-2. The results of sampling conducted by the Central Valley Regional Water Quality Control Board and Sacramento County Health Department are summarized in Table II-3.

E. Meteorology

The most significant meteorological parameter in assessing the potential for contaminant movement is rainfall. In the Sacramento area, most precipitation falls during the winter and spring months, with over half occurring during December, January and February. Table II-4 shows climatological data for the period 1971-1985.

Effective precipitation can be used as an indicator of the potential for leachate generation. The effective precipitation (mean annual precipitation 20.24 inches/year minus mean annual evapotranspiration 45 inches/year) in the Mather AFB area is -24.76 inches per year. This implies that precipitation has little chance to percolate to the regional groundwater table, suggesting in turn a low potential for leachate generation via precipitation, especially considering the low permeability of soils on and near Mather AFB (EPA/530/SW-168). A monthly water balance calculation was performed, using data from nearby Nicholas, California. This calculation verified that there is no percolation during most years.

F. Site-Specific Geology

The site-specific geology at Mather AFB is broken into four separate sites shown in Figure II-4. These areas correspond to the four sites studied in this project.

- ACW Disposal Site (Site 12)

Site 12 is located just east of the central quarter of the base and includes the ACW investigation site. AV drilled eleven groundwater monitoring wells in this area. Of these, six are deep wells drilled to the first confined aquifer

TABLE II-3. TCE Sampling Results for Off-Base Wells[(a)]
(California State Action Level: 5 ppb TCE)

	Well	Maximum Measurement (ppb)	Date of Maximum	Average of Measurements (ppb)	Other Compounds Found[(b)]
1.	Brugger	--	--	--	CT*
2.	Nobel	--	--	--	CT
3.	Lisher	--	--	--	CT
4.	FMC Properties	--	--	--	--
5.	Yokio, west well	1.4	3/82	0.2	PCE, CT
6.	Yokio, east well	--	--	--	PCE, CT
7.	Mather Camellia MHP	7.2	6/84	4.4	PCE, CT
8.	Matsumoto House	1.1	4/84	0.5	--
9.	Rand	9.3	1/82	5.6	--
10.	Gregory	22	11/85	7.6	T-1, 2-DCE
11.	Hayashi	22	11/85	5.5	T-1,2-DCE; 1,1-DCE
12.	Furuike	15	6/84	6.5	T-1,2-DCE; 1,1-DCE; PCE; 1,1-DCA
13.	Church of the Gedatsu	1.8	3/82	0.6	T-1,2-DCE; 1,1-DCE; 1,1-DCA
14.	Tanaka	--	--	--	T-1,2-DCE
15.	Cordova Truck Dismanters	0.2	1/82	<0.2	T-1,2-DCE
16.	Mather Truck Dismanters	--	--	--	--
17.	Kobata	--	--	--	--

a Data provided by Mather Bioenvironmental Engineering Shop. Samples collected and analyzed by State of California. All wells located along Happy Lane and Old Placerville Road, west of Mather AFB.

b Compounds found with equal frequency as TCE (or without TCE).

-- No record.

* Carbon Tetrachloride

TABLE II-4. Climatological Data for Mather AFB.

PRECIPITATION (inches; 1971-1985)

	J	F	M	A	M	J	J	A	S	O	N	D	Yrly
Mean	2.84	2.94	3.33	1.53	0.24	0.10	0.16	0.16	0.47	1.34	3.54	2 92	20.24
Std. Dev.	3.15	2.06	2.28	1.27	0.39	0.12	0.37	0.32	0.48	1.01	2.60	1.88	9.13
Minimum	0.34	0.51	0.63	0.18	0.00	0.00	0.00	0.00	0.00	0.01	0.34	0.33	6.71
Maximum	9.53	6.16	8.84	4.64	1.38	0.26	1.35	1.01	1.69	3.02	6.70	6.48	40.23
24-Hr. Max (1941-1981)	2.6	3.0	1.90	4.30	1.10	0.80	1.40	1.00	1.90	4.40	2.60	2.20	4.40

TEMPERATURE (°F; 1941-1981)

	J	F	M	A	M	J	J	A	S	O	N	D	Yrly
Mean Max.	53	59	64	70	78	86	93	91	87	77	63	54	73
Daily Min.	38	42	43	47	52	57	60	60	58	51	44	39	49
Mean Monthly	46	51	54	59	65	72	77	75	72	64	54	47	61
Extreme Max.	72	76	84	93	102	111	112	113	111	101	85	72	113
Extreme Min.	21	25	25	34	38	41	49	50	44	31	27	21	21

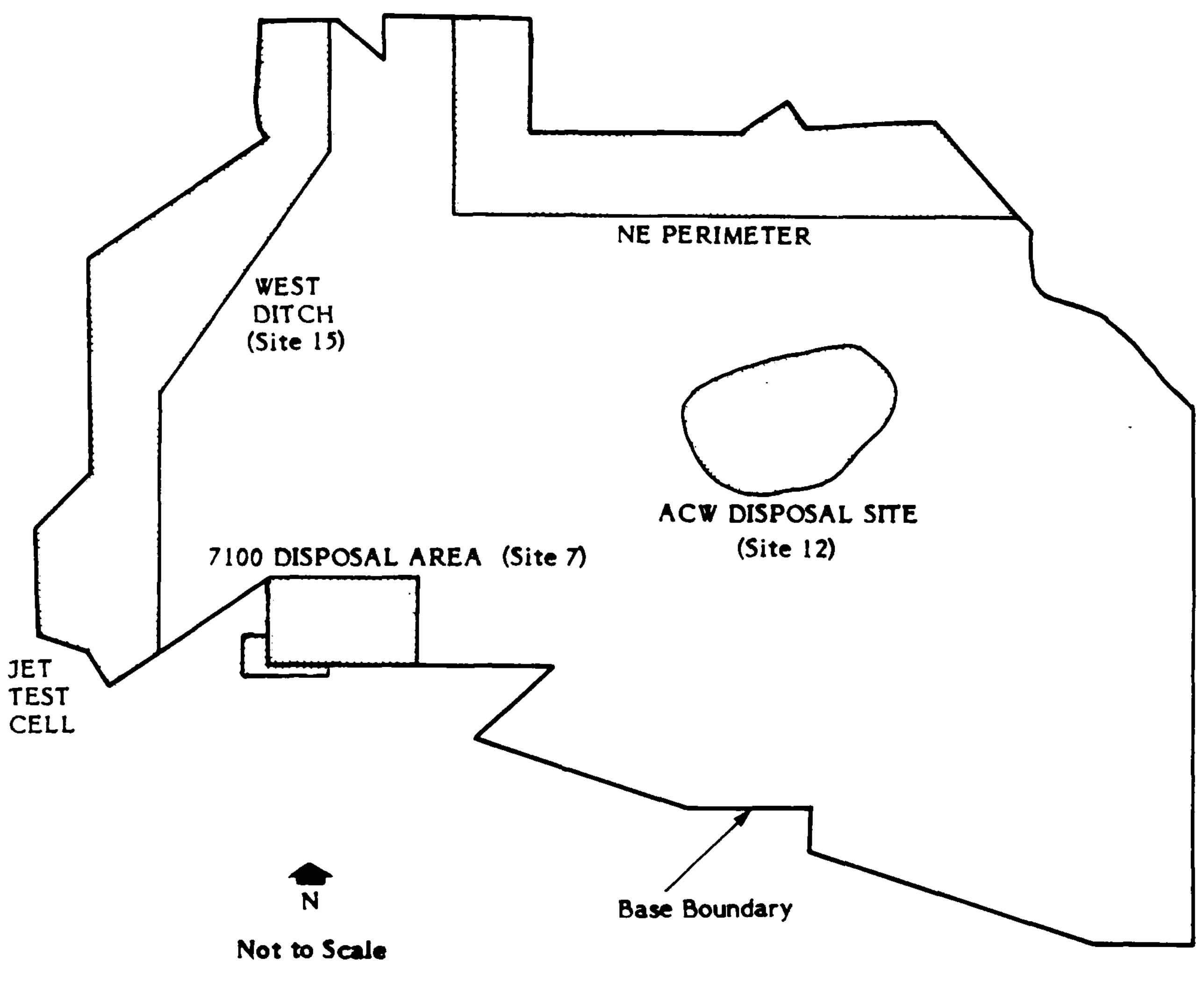


Figure II-4

Location Map of Investigation Sites

Mather Air Force Base

AeroVironment Inc.

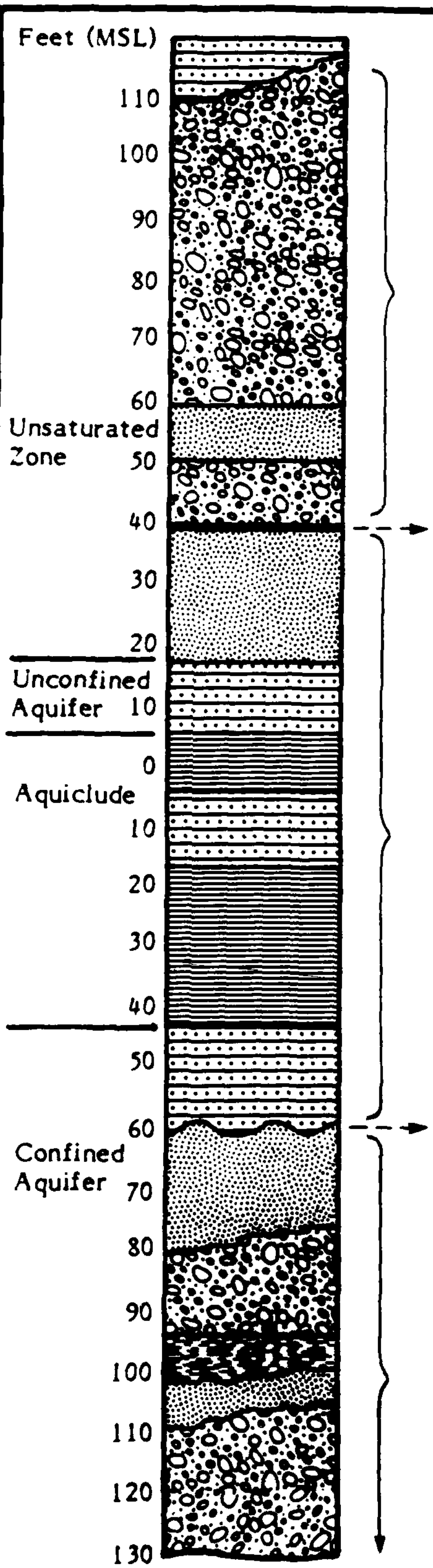
87-83

and the remaining five are shallow, drilled to the water table. In addition, this area contains three shallow wells from an earlier study (Weston Nos. 1, 2, 3) and an abandoned production well (ACW well).

Site 12 is covered by a shallow soil (<3 feet) described by the United States Soil Conservation Service (SCS) as Redding Gravelly Loam (CH2M Hill, 1982). Below the soil, the South Fork Gravel range in thickness from 50 to 88 feet (Figures II-5). These gravels are widespread: an almost continuous, laterally-extensive sheet of material characterized by thick (≤80 feet) intervals of unconsolidated cobbles and gravel. There are small localized segments of Victor Formation found in the hill-top areas of the site. In most wells, this sequence is briefly interrupted by 1- to 15-foot zones of coarse sand and, more rarely, fine sand and silt. Well MAFB No.-70, in the extreme southwest corner of the ACW area, displays anomalous characteristics. It has only one 20-foot bed of South Fork Gravel with overlying and underlying material primarily composed of interbedded sand and silt. This well may fall just outside the boundary of one south fork of the American River channel, which was mapped in this portion of Mather (CDWR, 1974), thus accounting for the paucity of gravel.

Directly underlying the South Fork Gravel at 90 to 100 feet below ground surface is the Laguna Formation. It is particularly well developed in this part of the base as a 100-plus-foot thick interval of fine-grained material, primarily clay and silt with lesser quantities of sand and, rarely, pea gravel. Stream channel deposits are rare in the Laguna but have been observed in several wells as relatively thin and discontinuous sand and silt beds. Well MAFB-71 displays a distinct basal channel gravel deposit overlain by progressively finer sands that probably represent channel bedforms and overbank sediments. Vertically and laterally adjacent clay may represent swamp or overbank lacustrine deposits, suggesting that a meandering rather than a braided fluvial system was operating during the time of Laguna deposition.

The Mehrten Formation underlies the Laguna Formation at a depth of 180 to 200 feet below ground surface. The uppermost 20 to 40 feet was



VICTOR FM; Thickness 0-10'; Sandy silt, not always present

SOUTH FORK GRAVELS; Thickness 54-85'; Gravel members 20-80' thick separated by sand intervals 1-25' thick

SOUTH FORK GRAVELS/LAGUNA FM; Contact is generally conformable, occasional slight unconformities

LAGUNA FM; Thickness 78-114'; Upper member composed of sand and silty sand 20-30' in thickness. Lower member composed of clay and sandy silt with occasional beds of sand

LAGUNA FM/MEHRTEN FM; Contact generally unconformable representing 3-5 million year hiatus.

MEHRTEN FM; Thickness 60^{+}-450'; Vertically stacked gravel to silt; fining-up cycles 20-30' thick; only upper 60' penetrated

Key

- Gravel
- Sand
- Silty Sand
- Silty Clay
- Clay

Figure II-5

Idealized Stratigraphy
ACW
Mather Air Force Base

AeroVironment Inc.

87-42

March 1987

penetrated only at the ACW site. These sediments are characterized by an upper 20 feet of sand (mapped locally as the Laguna-Mehrten Transition Zone) that becomes progressively coarser with depth. The sand is underlain by a basal gravel interval. This sequence is repeated and at least two distinct "gravel-to-sand" cycles have been recognized (CVRWQCB, 1980).

All wells were surveyed by a California registered surveyor and water levels are reported in elevations above or below mean sea level (see Table O-1 and O-2 for measuring point elevations).

Groundwater is first encountered at +14.7 to +22.7 msl and is occasionally semi-confined with a general flow toward the southwest. The water table is usually found in the uppermost Laguna Formation. Although the South Fork Gravel contains the coarsest material, it almost always lies above the water table because of the relatively high elevation in this part of the base. Water table conditions were encountered in all but one of the shallow wells. In that well (MAFB-52), a stiff clay was encountered at +18 feet to -38 feet msl. As a result, the well was screened in a semi-confined sandy zone (-27 feet to -47 feet msl). Water table elevations in all the shallow wells in Site 12 conform to regional trends.

Throughout the area, the Lower Laguna forms the confining layer above the Mehrten sands and gravels (confined aquifer), which first appear at -50 to -80 feet msl. Wells installed in the Mehrten were screened in a widespread sand and gravel interval encountered immediately below the Laguna. Piezometric head in the Mehrten confined aquifer ranges from +12.0 to +22.1 feet msl.

o 7100 Disposal Area (Site 7)

Site 7 is located in the southwest portion of the base and includes the 7100 Landfill investigation site. It also includes a small parcel of private land just outside the base boundary (see Figure I-3 and II-4). AV drilled a total of ten groundwater monitoring wells at this site: four to the confined aquifer in the Mehrten Formation, and six to the water table aquifer in the South Fork Gravels.

Five shallow wells from the Phase II, Stage 1 and 2 studies also lie in this area. In the SOW the Jet Test Cell wells were included in the 7100 area, but in the field they were best correlated with the West Ditch wells, that is why they are discussed in different places in the text.

The Victor Formation lies below the thin (1- to 2-foot) soil layer of San Joaquin Loam and extends in depth from 0 to 10 feet (Figures II-6). Distribution of the Victor is patchy; it occurs primarily in the southern and western portion of the 7100 Landfill site and thins to the north and east. The lithology ranges from sandy-silt to clay.

At Site 7, the South Fork Gravel underlie the Victor Formation at a depth of 0-10 feet. In the northern and eastern portion of the area the Victor is not present and the South Fork Gravel underlie the thin soil mantle. All wells encountered coarse gravels and cobbles that form an area-wide sheet of braided stream deposits to a depth of 36 feet to 46 feet below the surface. These sediments were laid down during periods of high discharge from the Sierra Nevada, probably during episodes of glacial melting (USGS, 1977).

The abrupt transition from gravel and cobbles to sand and silt at 36 to 40 feet below the surface marks the top of the Laguna Formation. The upper surface of the Laguna Formation displays some relief in outcrop exposures (CDWR, 1974), which represent a possible unconformable contact (disturbed natural succession of layers) with overlying South Fork Gravel. The Laguna is considerably coarser at Site 7 than at Site 12. The Formation's thickness ranges from 134 to 145 feet and is characterized by 10- to 50-foot intervals composed of clay and silt. These fine-grained members are separated by 10- to 24-foot thicknesses of sand and gravel, which are water-bearing materials with good porosity and permeability.

The sand and gravel of the Mehrten Formation lies below the Laguna Formation, at an average depth of 180 feet. Well MAFB-55 penetrated the upper 100 feet of the Mehrten, but the other deep wells penetrated only about 40 feet. Its maximum thickness in the Sacramento area has been mapped at 450 feet (CDWR, 1978). At Site 7, it is composed of discontinuous thin gravel beds with vertically adjacent sands and fines.

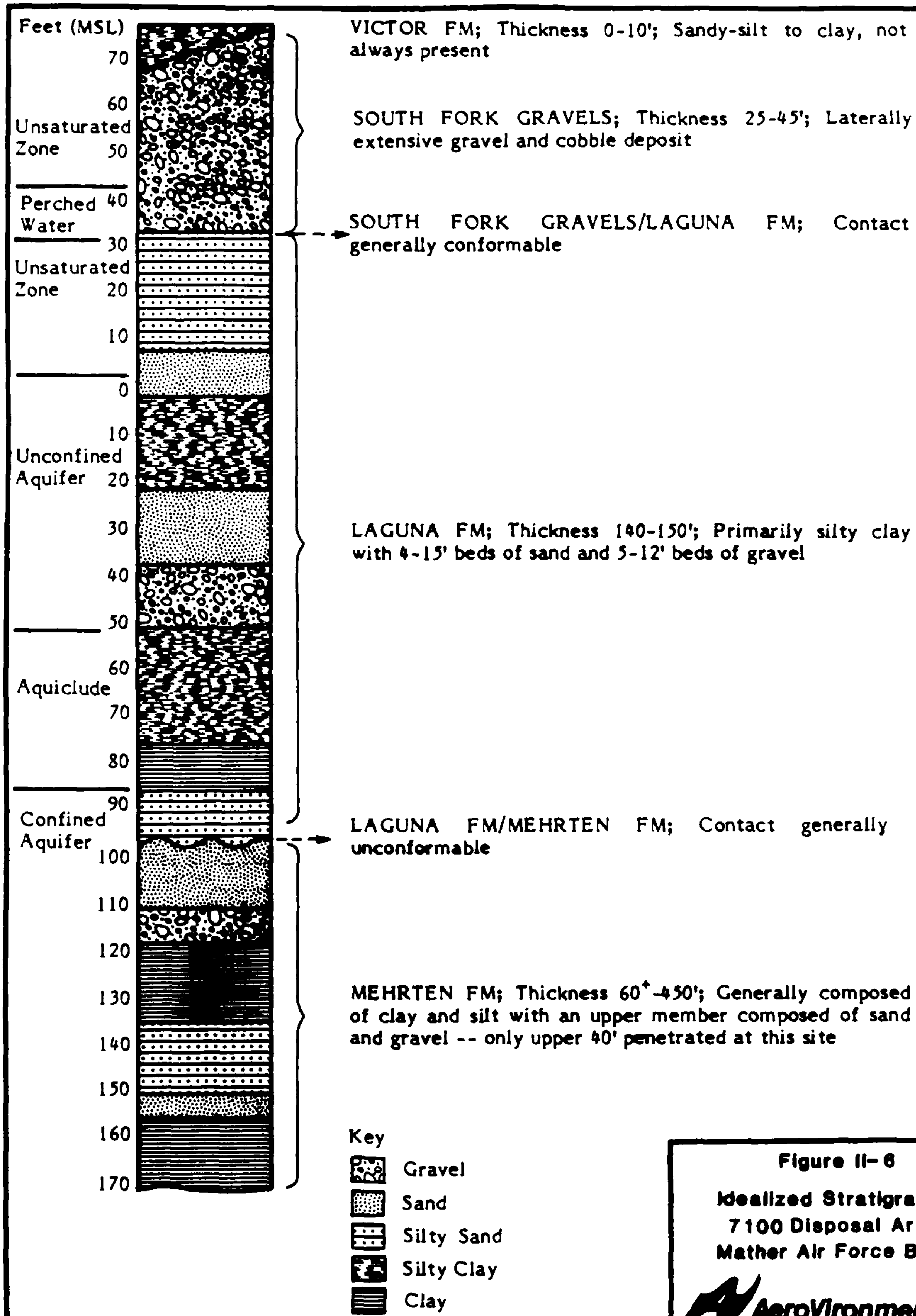


Figure II-6

Idealized Stratigraphy
7100 Disposal Area
Mather Air Force Base

AeroVironment Inc.

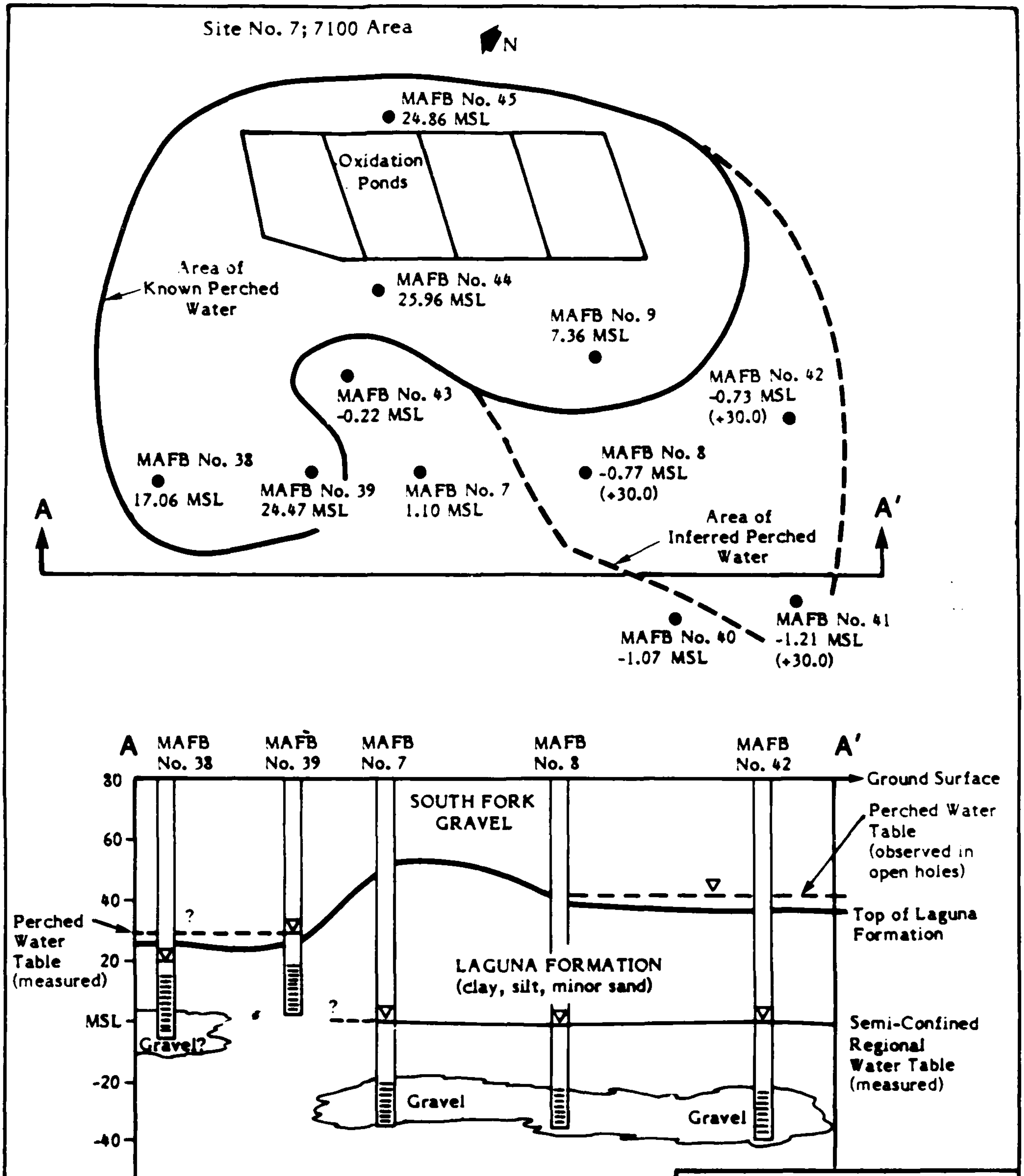
87-43

At the 7100 Landfill site very few stratigraphic units can be correlated from well to well with the exception of the thickest sand and gravel units. Lateral variation is dramatic in the smaller channel sands, which virtually disappear within several tens of feet. Well 55 displays significantly finer-grained lithologies than surrounding wells. In particular, the gravels normally present in the Mehrten Formation and occasionally present in the Laguna are absent.

The depth to first water varies at the 7100 Landfill site. For wells MAFB-56, 57 and 58, 24-inch diameter auger holes were drilled to a depth of 50 feet (approximately +30 feet msl). Eighteen-inch conducter casing was installed in the boring and grouted in place in order to shore-up the South Fork Gravels and prevent sloughing during pilot hole drilling. All borings had several feet of standing water in them within hours after completion. The conductor casing was set at the top of the Laguna Formation, suggesting that water was first encountered perched on top of the Laguna clays. Perched water in the South Fork Gravels Formation may be due to a mounding effect created by several acres of standing water in the sewage treatment oxidation ponds which is a seasonal feature. Standing water at the surface percolates downward through the South Fork Gravels and accumulates on top of the Laguna clays. Depth to perched water varies with the upper surface of the Laguna Formation. Figure II-7 illustrates this effect.

In adjacent shallow wells in the north part of the site (MAFB-44, 45, 39), groundwater was first encountered at +24.5 to +26.9 msl, a continuation of the region of perched water (Figure II-7). Centrally located wells (MAFB-43, 7) were drilled through a thickened interval of the Laguna Formation. These wells did not encounter perched water. In the southern area (MAFB 40, 41, 42), well screens were placed within gravel beds under semi-confined conditions. Piezometric head ranged from -0.7 to -3.5 msl.

All wells were screened in the upper or middle Laguna Formation. Due to the varying lithologies encountered in the Laguna, screen placement depended on the depth to the first sand below the regional water table elevation, which was anticipated to be approximately +5 feet msl. Often these sandy intervals occurred at depths ranging from -20 to -50 feet msl and were overlain by clay, creating a semi-confined condition.



Key:
Wells are shown with the water level elevation measured in Jan. 1987. All units are in feet above mean sea level (MSL). Numbers shown in parenthesis are approximate water levels observed in the open hole, prior to casing installation.

Figure II-7
Illustration of Perched Water
Mather Air Force Base

AeroVironment Inc.

87-41

The Lower Laguna Formation forms the regional confining layer above the Mehrten sands and gravels (confined aquifer), which first appear at -100 to -119 msl. Piezometric head in the confined Mehrten Formation aquifer ranges from -2.2 to -7.4 msl. The Mehrten was screened in sandy and rare gravelly zones encountered between -96 feet and -170 feel msl. A geologic fence diagram of the 7100 area may be found in Figure IV-3 on Page IV-5.

- West Ditch Area (Site 15)

Site 15 extends along the extreme western boundary of the base. AV drilled six wells (four deep, two shallow) along the West Ditch and one shallow well (Well 49) northeast of West Ditch near the base commissary. In addition, we drilled one shallow and one deep well near the jet test cell (Wells 46 and 59) to the south of West Ditch. The area also contains two shallow wells from the Phase II, Stage 1 study.

A layered stratigraphy dominates the area, displaying relatively uniform formational thicknesses and a gentle dip to the southwest. The local stratigraphy is capped by a loamy surface soil underlain everywhere by about 8- to 20-foot-thick interval of sandy Victor Formation (Figure II-8). Below the Victor, in all wells, lie the South Fork Gravel. Gravel beds vary in thickness from 10 feet to 40+ feet and are generally thickest at the extreme central west portion of the West Ditch area. The gravel beds thin to the north and south, although the South Fork Gravel maintain an overall thickness of 35 to 50 feet.

The Laguna Formation lies below the South Fork Gravel at a depth of 52 to 72 feet below the ground surface. Formation thickness ranges from 50 to 94 feet and lithologies are dominated by sand, silt and clay. There is a higher percentage of sand in the Laguna at West Ditch than at the three other areas. Sandy intervals are up to 30 feet thick and are locally correlatable. Silt and clay occur interbedded or as homogeneous beds up to 15-feet thick. Well MAFB-60 shows an anomalous 22-foot-thick gravel bed. The geometry and relative amounts of silt, clay, gravel and sand suggest deposition by a slow, meandering fluvial system (University of Oxford, 1979).

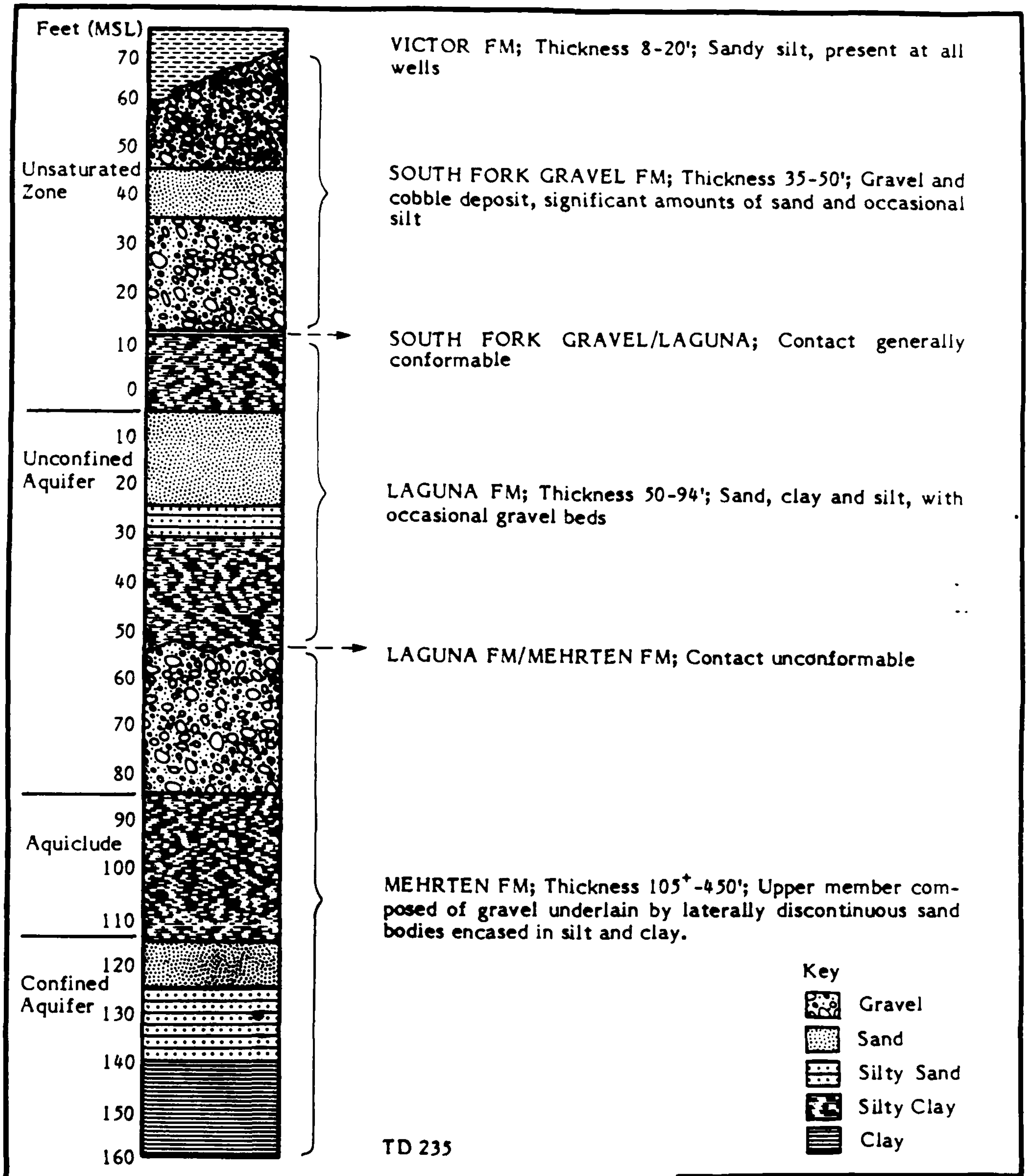


Figure II-8
Idealized Stratigraphy
West Ditch, and Test Cell
Mather Air Force Base

AeroVironment Inc.

87-44

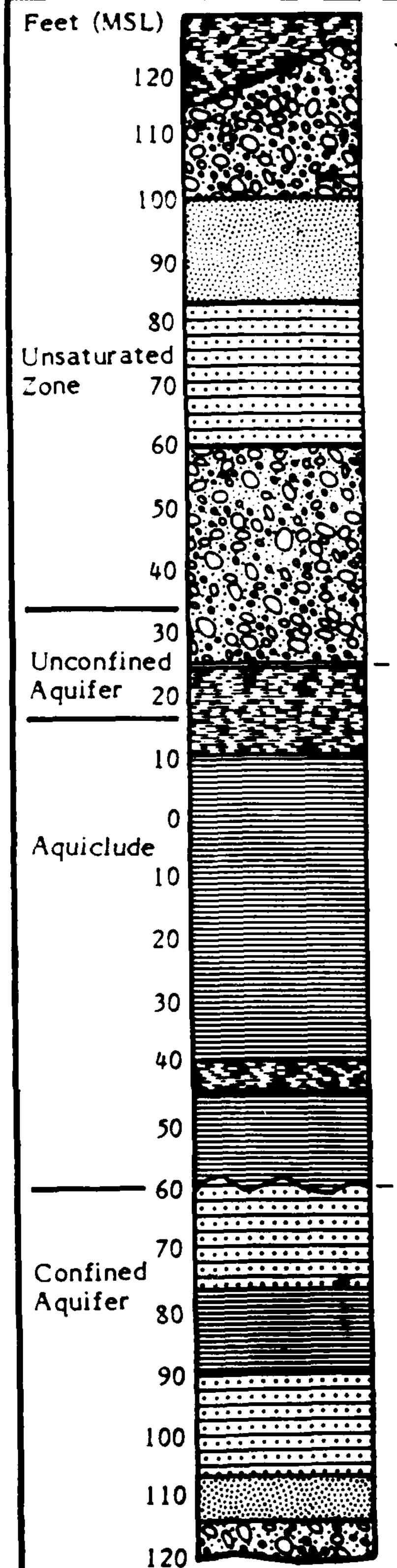
The Laguna-Mehrten contact was encountered at 110 feet below ground surface in the northern portion of Site 15 and at about 148 feet at both wells at the jet test cell. There is a gentle dip of 20 to 40 feet per mile to the southwest, which accounts for the apparent change in marker bed elevation with horizontal distance (Figure II-8). At West Ditch, the Mehrten Formation was penetrated to a depth of 115 feet below the Laguna Formation. The lithologies encountered include an upper gravel layer (15 to 35-feet thick and used a marker bed) located just below the Laguna. This locally-correlatable gravel is underlain by discontinuous bodies of sand encased in silt and clay.

Groundwater occurs under water table conditions in the Laguna Formation at all the shallow wells except near the commissary at MAFB-49, where it is semi-confined. The water table varies from +14.9 feet msl to +1.9 feet msl with surface elevation, thereby conforming to expected regional water levels. The fine grained material of the Mehrten Formation forms the confining layer above the second (Mehrten) aquifer, which was screened 171 to 204 feet below the surface in a sand and silt unit. Piezometric head in the second aquifer ranges from +1.9 feet msl to -5.6 feet msl.

o Northeast Perimeter

AV drilled six groundwater monitoring wells in this area. Of these, three are shallow and three penetrate the second (Mehrten) aquifer. The United States Conservation Service lists the soil in this area as Corning Gravelly Loam. It is generally no more than 3 to 5 feet thick and is developed on the Victor Formation or the South Fork Gravel where the Victor is absent (CH2M Hill, 1982). The Victor is composed of silty clay in this area and is present at all wells except MAFB-65 and 75 (Figure II-9).

The thickest interval of South Fork Gravel at Mather AFB is found in the Northeast Perimeter Area, ranging from 100 to 110 feet. Lithologies encountered include a 15 to 20-foot upper gravel layer and a 30- to 60-foot lower gravel layer separated by 10 to 30 feet of fines. Below the South Fork Gravel, the Laguna Formation is 60 to 92 feet thick, extending to a maximum depth of 200 feet



VICTOR FM; Thickness 0-15'; Silty clay, not present everywhere

SOUTH FORK GRAVELS; Thickness 100-110'; Upper and lower member composed of gravel-cobble conglomerate separated by middle member composed of silty sand

SOUTH FORK GRAVEL/LAGUNA FM; Contact conformable

LAGUNA FM; Thickness 60-92'; Primarily clay and silt at this location

LAGUNA FM/MEHRTEN FM; Contact unconformable

MEHRTEN FM; Thickness 60^{+}-450'; Silt, clay, minor gravel and sand beds

Key

- Gravel
- Sand
- Silty Sand
- Silty Clay
- Clay

Figure II-9
Idealized Stratigraphy
NE Perimeter Site
Mather Air Force Base

AeroVironment Inc.

87-45

below ground surface. At this site, the Laguna is very fine grained composed almost entirely of clay and silt. The Laguna-Mehrten contact occurs between 170 and 200 feet below ground surface. Below the contact and to a depth of at least 280 feet (the maximum depth of the investigation), the Mehrten is composed of silty sand, clay and occasional discontinuous gravel beds.

Overall, the sedimentary sequence dips to the southwest providing a significant degree of dip between Wells MAFB-66 and 65, which lie on a roughly east-west trending line.

The above description of the Northeast Perimeter site differs slightly from that presented in the IRP Stage 2 report (AeroVironment Inc., 1986). Current revisions are based on new data collected during the drilling phase of the Stage 3 project.

Groundwater is first encountered in the South Fork Gravel at +38.4 to +21.8 feet msl under water table conditions, which conforms to regional groundwater trends. The Laguna Formation forms the confining layer over the Mehrten Formation aquifer. Piezometric head in the Mehrten confined aquifer ranges from +26.3 to +7.9 msl.

G. Site Descriptions

The locations of the sites at Mather AFB are shown in Figure II-4. This section provides physical descriptions of each of the four sites, including location, type of operation and suspected contaminants.

1. Site 7 -- 7100 Disposal Area

Site 7 is located in the southwest portion of the base, south of the now-abandoned sewage treatment plant and south of the current fire protection training area. This site also contains a borrow pit excavated to a depth of 40 feet below grade, which lies just off base to the west of the landfill.

The 7100 Disposal Area was originally a borrow pit reportedly used for the extension of the runway. Currently it is used for the disposal of inert construction rubble. From 1953 to 1966, the landfill was a disposal site for POL wastes, empty drums, sludge from the plating shop, absorbent sand used in cleaning up oil, and other wastes, including transformer oil (CH2M Hill, 1982). Currently, TCE is the only quantified contaminant at the 7100 Disposal Area (Weston, 1985).

2. Site 12 -- ACW Disposal Site

Site 12 is located in the old Air Command and Warning area in the east-central portion of the base just south of the alert apron. It is currently operated by the FAA and SAC security police; before 1966, the 668th ACW Squadron operated the site jointly with the FAA. In the Phase I, Stage 1 report CH2M Hill stated that waste solvents and possibly transformer oil were disposed of in a 10-inch pipe located approximately 100 feet southwest of the ACW radar installation. In the Phase II, Stage 1 investigation, Roy Weston, Inc., detected TCE contamination downgradient of this site.

3. Site 15 -- West Ditch

Site 15 is located in the extreme western portion of the base. It is an unlined open drainage ditch that receives storm runoff from the entire main base area.

The Phase I, Stage I report (CH2M Hill, 1982) reported that after installation of an oil skimmer in 1967, waste oils and solvents were dumped directly into the skimmer from which they overflowed into the ditch. Many of the floor drains in the shop areas were connected to a storm sewer, which may have delivered additional waste oils and solvents to the ditch. The California Regional Water Quality Control Board has detected levels of volatile organic chemicals (VOCs) (TCE and others) above the State Action Level in off-base water supply wells downgradient from West Ditch. Levels of carbon tetrachloride above the state action level have also been found in private wells along Old Placerville Road.

4. Northeast Perimeter

The Northeast Perimeter is just inside the base boundary and upgradient from the rest of the base. Contamination carried onto the base from industrial operations to the north and east would enter the base from this direction. For this reason, AV has installed three deep and three shallow groundwater monitoring wells in this area to serve as background indicators of water quality. The only contaminant confirmed in this area is 1,1,1-trichloroethane, which was found at low concentration during the Phase II, Stage 1 investigation.

H. Summary of Environmental Setting

A review of the environmental setting at Mather AFB reveals the following pertinent information:

- o Soils are characterized by low permeability (CH2M Hill, 1982) and a local effective precipitation of -24.76 inches per year (CH2M Hill, 1982; NOAA, 1985), both of which create a low driving force for contaminant migration. However, a pathway for groundwater contamination may be created if the impermeable hardpan layer below the surface soil is penetrated (CDWR, 1978). The base's low topographical relief may increase the infiltration rate as well.

- o Surface soils surrounding Mather AFB to the north, northwest and west are highly permeable because of past gold mining operations (CDMG, 1975). A large industrial complex upgradient of Mather AFB, which sits atop this highly permeable soil, may be a source of migrating contaminants (CVRWQCB, 1980).

- o Buried stream channels of the American River are known to enhance horizontal contaminant migration (CDWR, 1974). In addition, the previously mentioned industrial complex lies directly upgradient of the base and over a buried stream channel. This could contribute to contaminant migration on base as well.

- The geology on base generally consists of surface soils of low permeability, below which lies the Victor Formation. This is made up of interbedded sands and clays, which inhibit contaminant migration from the surface. Below this Formation sits a highly permeable sand and/or gravel zone that may be South Fork Gravel, depending on the site-specific geology. Under these gravel, lies a zone similar to the Victor Formation called the Laguna Formation. The water table aquifer generally occurs in the lower portion of the South Fork Gravel or the upper Laguna Formation. The lower Laguna provides the confining layer above the Mehrten Formation, which generally contains the first confined water. The Mehrten is composed of interbedded sand, clay, silt and occasional gravel (CDWR, 1978).

- The 15 base supply wells at Mather AFB are used for irrigation, fire protection, washwater or general water supply on base. In general, the main base wells produce water of good quality. Some off-base wells within two miles of the base have been found to contain traces of TCE (Weston, 1986).

III. FIELD PROGRAM

A. Development

1. Preliminary Activities

AeroVironment Inc. (AV) began its involvement at Mather AFB in May 1985 as part of the Phase II Stage 2 effort. While AV was still completing the Stage 2 work at 15 sites on the base, USAFOEHL requested that AV begin a Stage 3 program to assess the conditions at the three Stage 1 sites and evaluate the work needed to further characterize these sites. The Stage 1 sites were not included in the Stage 2 sites. AV was already familiar with the general geologic and hydrologic conditions at Mather AFB based on the drilling and sampling conducted during the Stage 2 investigation. The initial Stage 3 statement of work (SOW) was agreed upon by USAFOEHL, Air Training Command state and federal regulatory personnel. After this agreement, only minor operational changes were made to the SOW by AV and USAFOEHL. Appendix B is the finalized statement of work for this task order.

2. Subcontractor Selection

a. Drilling. The statement of work specified drilling 33 groundwater monitoring wells using conventional mud rotary technique. We selected Beylik Drilling Inc. of La Habra, California, because of their experience drilling at Mather AFB and working with AV. Beylik had performed the Stage 2 drilling for AV in 1985.

b. Geophysical Studies. The statement of work required AV to conduct geophysical studies at the ACW and 7100 landfill sites. The Earth Technology Corporation of Long Beach, California, and Converse Consultants of San Francisco, California, were asked to submit proposals to perform the necessary work. The proposals were basically equivalent; technically and financially. Earth Technology was selected based on their experience with AV at Mather AFB during the Stage 2 effort. In addition, Earth Technology owned all of the equipment necessary for the work.

c. Soil Gas Survey. The statement of work described a soil gas survey at the ACW site to help define the TCE plume which was thought to exist. During the period from May 1986 through August 1986, AV asked three firms to submit cost estimates to complete five days of soil gas field work. Fluor Corporation (now Intellus) of Irvine, California, Woodward-Clyde Inc. of Santa Ana, California, and Tracer Research Corporation (Tracer) of Tucson, Arizona, submitted estimates. Tracer was selected based on their cost estimate and the reputation of their principal scientist, Dr. Glen Thompson.

3. Safety Plan

AV and Air Force policies require that an appropriate health and safety plan be prepared before field activities can begin. Safety concerns related to this field work focused on the hazardous nature of some chemicals suspected of being present at the site, as well as the "unknowns" relative to exact location, concentration and volume of possible contaminants. In addition, the potential for mechanical injury from drilling machinery was of concern.

The site safety plan used by AV's field team is included as part of Appendix K. It required that all field personnel wear standard work outfits (steel-toed boots, hardhats, etc.). It also required that the air at all sites be monitored for organic vapors, oxygen deficiency and explosive gases.

Work at all the sites at Mather AFB consisted of drilling and groundwater sample collecting. These activities bring to the surface potentially contaminated soils and water that were previously isolated. The potential for skin exposure or inhalation was significant. The drilling program was specifically designed to eliminate drilling through waste material or spill sites. AV placed all wells at upgradient or downgradient locations. All work areas were relatively flat, out of doors, with good air circulation. At each sampling location, when handling apparently uncontaminated samples, workers wore new, disposable latex gloves at each sampling location to keep skin clean and to avoid cross-contamination from sample handling.

The ambient air was monitored to alert the field team if hazardous concentrations in the breathing zone rose above acceptable levels. The following action levels were set up for organic vapor meter readings:

0-5 ppm (above background):	no respiratory protection needed
5-50 ppm:	air purifying respirator with organic chemical cartridge
50 - 500 ppm:	self-contained breathing apparatus
500 ppm and above:	no work

Other criteria were set for oxygen deficiency and explosive gases.

The site safety plan was submitted to the California Department of Health Services (DOHS) for review and approval. Approval was received from the DOHS project officer on August 8, 1986.

B. Implementation of Field Program

1. Drilling and Well Installation

Using information derived from earlier IRP studies, we selected well locations both downgradient and upgradient from the sites to be investigated. At the 7100 Landfill site we used geophysical survey results to "fine tune" the drilling location to intercept any contamination plumes. Well locations were coordinated with the California Regional Water Quality Control Board and the Department of Health Services Toxic Substances Control District before drilling started. Table III-1 shows the schedule of drilling and well construction.

All wells were drilled using conventional mud-rotary methods using an Ingersoll Rand T-100. This drilling method has been approved by the California Regional Water Quality Control Board and has been used successfully to drill numerous monitoring wells into the confined aquifer system near Mather AFB. A 24-inch flight auger was used to drill and install 18-inch conductor casing to a depth of 55 ft in all of the deep wells at the 7100 area (see Table III-2) after a severe sloughing problem was encountered in the shallow gravels (0-50'). The conductor casing prevented gravel sloughing and allowed more efficient drilling of the pilot boring.

TABLE III-1. Well drilling, construction and development timetable.

Date	Drilled	Constructed	Developed
8/15	43		
8/16	43		
8/17		43	
8/19	44		
8/20	44	44	
8/21	45		
8/22		45	
8/23	47		
8/24	48	47	
8/25	63	48	
8/26	63		
8/27		63	
8/28		63	
8/29		63	
9/2		63	
9/3	63		
9/4	63, 62		
9/5	62	63	
9/6	62	63	
9/7	62, 61	63	
9/8	61	63	47, 43, 44
9/9		61, 62	45, 63, 48
9/10		61, 62	45, 48, 63
9/11		62, 61	63
9/12	65, 64		62
9/13		65, 64	
9/14	49	65, 64	
9/15	49, 66	49	
9/16	40	66, 40	
9/17	41	66, 41	
9/18	46, 42, 55, 52	66, 41, 42	
9/19	55, 46	46	
9/20	59	55	
9/21		55, 59	
9/22	57	59	
9/23	58	57, 58	
9/24		57, 58	
9/25	56	58, 56	
9/26	60	56	
9/27	50	60, 50	
9/28	68	60	
9/29	73, 68	73	62, 46
9/30	75	68, 75	49, 61, 60
10/1	52, 67	68, 52	61, 58, 55, 40
10/2	70, 67	67	49, 61, 56, 42
10/3		70, 67	57, 41, 40, 68
10/4		67, 70	68, 64, 65, 75
10/5	54, 69	54	75, 66, 73
10/6	71	69	70, 52, 50
10/7		71, 69	50, 59, 67
10/8	51, 53	71	61, 54, 62
10/9	53, 72	51, 53	69, 71
10/10	72, 76	76, 72	53, 51
10/11		72	76, 61
10/12			72

a. Well Installation

o Shallow Wells

Eighteen shallow wells were installed to monitor the upper most saturated zone at Mather AFB. Figure I-3 showed the location of these wells. Figure III-I illustrates a typical shallow monitoring well, and Appendix D contains schematic diagrams of all wells installed for this project, along with the lithologic and geophysical logs of the borings. Table III-2 shows the well depths and screened intervals for the shallow wells.

Initially, a 9-7/8" borehole was drilled to an average depth of 120 feet below ground surface. AV's on-site hydrogeologist collected and described the drill cuttings. AV personnel determined the total depth of each boring, depending on the regional water table elevation and the type of material encountered during the drilling.

Once the bore hole reached the desired depth, we ran an E-log (SP, lateral resistivity and point resistivity). Using drill cuttings, E-log traces and data from adjacent wells, the on-site hydrogeologist designed the well to maximize its production potential and to assure that the well screen was set at the first extractable water encountered. The well design conformed to the Air Force's general specifications and to the specific subsurface condition found at the site.

o Deep Wells

Eighteen deep wells were installed to monitor the first (uppermost) confined aquifer (Laguna or Mehrten Formation). Figure I-3 showed the location of these wells. Figure III-2 diagrams a typical deep well, and Appendix D contains diagrams of all wells installed along with lithologic and geophysical logs of all the borings. Table III-2 shows the well depth and screened intervals for the deep wells. Initially, we experienced some trouble logging and completing the holes. This was entirely caused by equipment breakdowns, poor quality (in some cases slightly bent) conductor casing, and improper mud

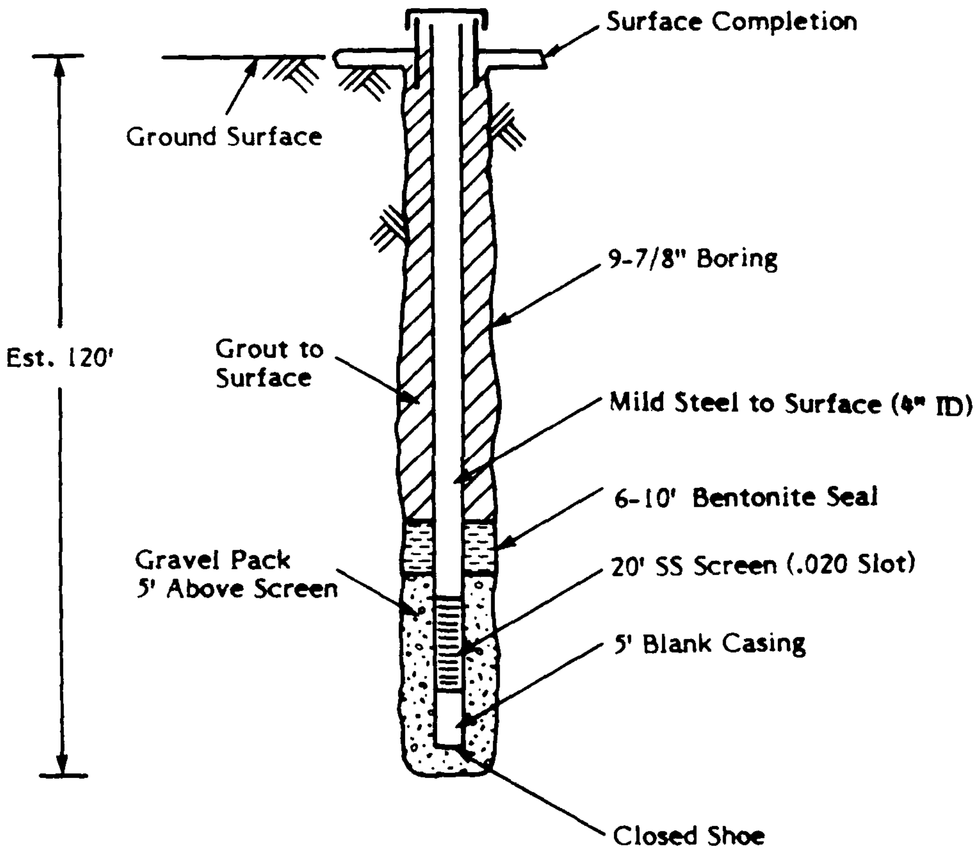


Figure III-1

Typical Shallow Well

Mather Air Force Base

AeroVironment Inc.

TABLE III-2. Well Depths and Screened Intervals

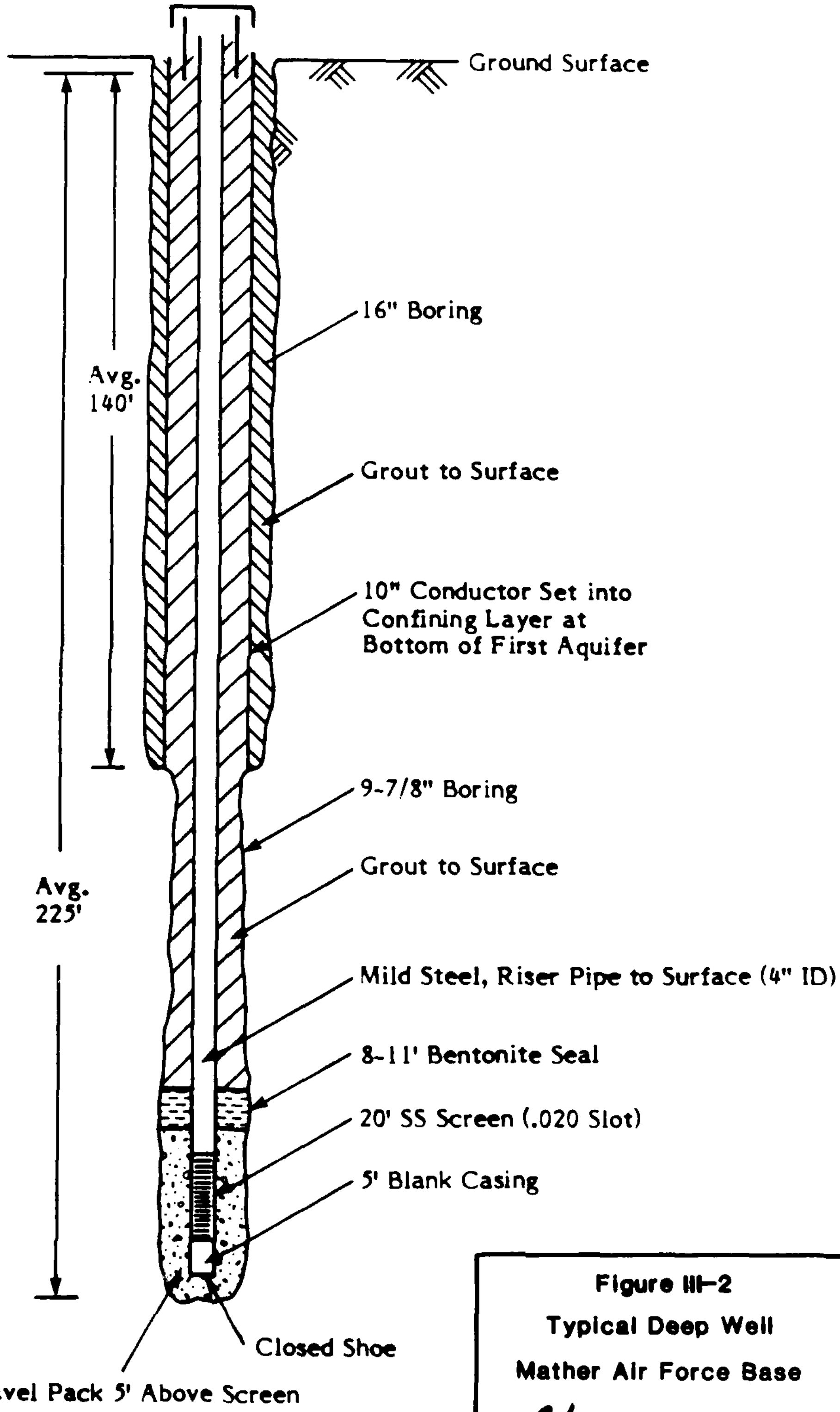
Shallow Wells

Well No.	Site	Total Depth in Ft. Below Ground Surface	Screened Interval (Ft. Below Ground Surface)
40	7100	124	92-112
41	7100	150	100-120
42	7100	133	90-110
43	7100	133	108-128
44	7100	110	60-80
45	7100	105	55-75
46	Jet Test Cell	116	70-90
50	ACW	130	100-120
51	ACW	170	105-125
52	ACW	140	105-125
53	ACW	181	157-177
54	ACW	144	110-130
47	West Ditch	108	75-95
48	West Ditch	133	70-90
49	(West Ditch) Commissary	122	99-119
73	NE Perimeter	135	112-132
75	NE Perimeter	114	91-111
76	NE Perimeter	121	87-107

TABLE III-2. (con't)

Deep Wells

Well No.	Site	Total Depth (ft)	Screened Interval (ft)	Depth to Bottom of Conductor (ft)	Depth to Bottom of Surface Casing (ft)
55	7100	250	225-245	126	--
56	7100	209	177-197	152	55
57	7100	200	177-197	156	55
58	7100	245	171-191	150	55
59	Jet Test Cell	240	160-180	131	55
67	ACW	213	190-210	117	--
68	ACW	245	207-227	110	--
69	ACW	237	207-227	130	--
70	ACW	205	183-203	142	--
71	ACW	247	200-220	177	--
72	ACW	216	192-212	130	--
60	West Ditch	245	175-195	164	55
61	West Ditch	230	184-204	165	--
62	West Ditch	240	181-201	165	--
63	West Ditch	242	175-195	155	--
66	NE Perimeter	280	247-267	142	--
65	NE Perimeter	224	195-215	115	--
64	NE Perimeter	240	175-195	115	--



86-77

Figure III-2
Typical Deep Well
Mather Air Force Base

AeroVironment Inc.

viscosity/thickness. The South Fork Gravels, which are found very near the surface, are very difficult to drill with any method. In an effort to seal the borehole during the initial phases of drilling, a number of different things were tried. One of these was working with the mod consistency. After the initial problems were worked out, and the proper conductor casing was delivered, the work went smoothly.

Beylik drilled a pilot bore with a diameter between 6 and 9-7/8" for all deep wells. Originally, the pilot boring was 5-7/8"; this was increased to 9-7/8" after we began having trouble getting the E-log probe to drop through the smaller boring. The total depth of the pilot bore depended on the depth to the first sandy or gravelly bed encountered below the Laguna Formation, which generally forms the confining layer. Once the pilot bore was completed to the desired depth, we ran an E-log (SP, lateral and point resistivity). The criteria evaluated to determine screen placement were the same as for the shallow wells.

Once Beylik had the casing schedule (well design), they reamed the pilot bore at a diameter of 15" - 17" to the required depth and grouted a 10" inner diameter (ID) conductor casing in place to seal off the uppermost water bearing zone (water table). The annular space between the conductor casing and bore hole was pressure grouted, using a construction tremie pipe with either neat cement (9-sack) or "Class A" (6-sack) Portland cement-sand slurry with up to 5% bentonite to reduce shrinkage. The grout used to fill the annular space between the bore hole wall and the conductor casing prevents contamination from migrating between the ground surface and the water-table. No further work was permitted in the hole until the grout had set, as determined by the examination of grout samples collected at the time of emplacement.

o Well Screening and Sealing

The well screen and 4" ID riser pipe were suspended in tension from the surface by means of a clamp. The bottom of the well screen was at a sufficient distance above the bottom of the bore hole to ensure that none of the casing would be supported by the bottom of the hole. Beylik placed centralizers at each end of the screened interval and with 40-foot spacings on the

blank pipe. Before the gravel pack was placed, they thinned the drilling fluid with clean water from the installation drinking water system.

Gravel pack (8-12 granular mesh) was installed using a construction tremie pipe and extended to a height of five feet above the top of the well screen. A two- to three-foot very fine-grained silica sand was installed above the gravel pack. The tight-packing nature of the very fine silica sand prevents overlying bentonite from contaminating the gravel pack and hindering the well development process. Next, Beylik placed an additional six- to eight-foot bentonite seal (1/4-inch pellets) directly above the silica sand. From the top of the bentonite to the surface, the annular space between the well casing and the bore hole or conductor casing was pressure grouted via a tremie pipe, using the same grout mixture that was used to grout the conductor in place. At no time was the grout allowed to free-fall more than 20 feet from the bottom of the tremie pipe.

b. Well Development

Beylik developed the wells shortly after they were drilled, using standard water well techniques (Driscoll, 1986). All wells were first swabbed and bailed using a close-fitting dart-bottom suction bailer to remove any sediment buildup that would fill the screened interval of the well casing. Next, Beylik pumped until the water was flowing clean and clear. Finally, Beylik bailed out all sediment that had accumulated during pumping and capped the well. By using this method, the average well was developed in four hours.

c. Surface Completion

One well (MAFB 69), sited within the ACW, development was completed flush with the ground surface and placed in a concrete "christe" box with a locking cap. The remaining wells extend two to three feet above ground surface. We shielded them with a steel guard pipe and working lid set in a four-foot square, four-inch thick concrete pad. All well casings were topped with threaded plastic caps.

2. Groundwater Sampling Phase

AV conducted two rounds of groundwater sampling approximately one month apart. Table III-3 summarizes specific sampling information. Table III-4 shows the sampling dates. Each sampling round included 35 wells installed as part of Phase II, Stage 3, 1 well installed as part of Stage 2, and 8 of 11 wells from Stage 1 for a total of 44 monitoring wells. AV sampled 10 out of 15 production wells during the second round. Figure I-3 shows the monitoring well locations.

AV collected one set of samples for analysis by Acurex and a complete set of split samples for USAFOEHL. The California Regional Water Quality Control Board also received a split of all volatile organic analysis samples.

For each sampling round, two field crews were mobilized: a well evacuation crew of two members and a sampling crew of two to three members. The evacuation crew initiated the operation by measuring the static water level with a Powers Electric well sounder. Then five casing volumes were removed from the well with a submersible impeller pump. While pumping, the crew recorded initial and final readings for water pH, conductivity and temperature. These data appear in Appendix G (Table G-2). AV used an Orion Research Model 211 pH meter and a Horizon Ecology Type 1840-10 conductivity meter. Unless the well needed more time to recover, the sampling crew immediately began the sampling procedure. Two members sampled the well with a 1-7/8 inch diameter stainless steel bailer and nylon rope pulley system, while the third documented the sampling. A dedicated sampling line was used at each well. The volume of water removed depended on the types of chemical analyses for which the sample was needed. Table III-3 shows the types of analyses, size of samples, and preservatives required.

The first two bailers of well water were used to rinse the decontaminated sample bucket. Volatile organic analysis (VOA) samples were taken first and poured directly from the bailer into the sample bottles. After the required volume for additional parameters was poured into the sample bucket, the sample was funneled into the appropriate sample bottles. For metals samples, the sampling crew carefully filtered the water through a Geotech pressurized

TABLE III-3. Analytical and Sampling Methods Summary

Parameter	Method	Description	Method Detection Limit (MDL)	Maximum Holding Time	Preservation	Sample Container	2nd Column Confirmation
Volatile Organics	EPA 601	Purgeable Halocarbons by Hall/GC	As specified in methods	14 days	Cool to $4^{o}C$	40 ml glass	Analyte > MDL
	EPA 8020	Aromatic volatile organics by PID/GC		7 days	Cool to $4^{o}C$	40 ml glass	Analyte > MDL
Petroleum Hydrocarbons	EPA 3550 EPA 418.1	Total petroleum hydrocarbon compounds IR method	1 mg/L	28 days	H_2SO_4 to pH < 2 Cool to $4^{o}C$	1 L glass	
Total Phenolics	EPA 420.1	Total phenolic compound content, colorimetric method	5 µg/L	28 days	H_2SO_4 to pH < 2 Cool to $4^{o}C$	1 L glass	
Common Anions	SM 429	F^-, CL^-, NO_2^{2-}, PO_4^{3-}, BR^-, NO_3^-, SO_4^{2-} by ion chromatography	As specified in method	CL, F, Br, SO_4: 28 days, NO_2, NO_3, PO_4: 48 hrs	Cool to $4^{o}C$	1 L HDPE*	
Metals & Minerals	EPA 200.7	Ba, Cd, Ca, Cr, Fe, Pb, Mg, Mn, Ag, Na, K by ICP	See Appendix A Page 20	6 months	HNO_3 to pH < 2 Cool to $4^{o}C$	1 L HDPE	
Arsenic	EPA 206.2	As by graphite furnace AAS	0.001 mg/L	6 months	HNO_3 to pH < 2 Cool to $4^{o}C$	1 L HDPE (with Hg, Se)	
Mercury	EPA 245.1	Hg by cold vapor AAS	0.0002 mg/L	28 days	HNO_3 to pH < 2 Cool to $4^{o}C$	1 L HDPE (with As, Se)	
Selenium	EPA 270.2	Se by graphite furnace AAS	0.002 mg/L	6 months	HNO_3 to pH < 2 Cool to $4^{o}C$	1 L HDPE (with As, Hg)	
TDS	EPA 160.1	Total filterable	10 mg/L	48 hours	Cool to $4^{o}C$	1 L HDPE	residue by gravimetry
Alkalinity	SM 403	Carbonate, bicarbonate and hydroxide alkalinity	N/A	14 days	Cool to $4^{o}C$	1 L HDPE (with TDS)	
Cyanide	EPA 335.2	CN^- analysis by UV visible spectroscopy	.01 mg/L	30 days	NaOH to pH > 12 Cool to $4^{o}C$	1 L HDPE	

*HDPE = high density polyethylene

TABLE III-4. Sampling Timetable

Date	Wells Sampled (Does not include duplicate or split samples)
Round 1	
11/10/86	51, 52
11/11/86	70, 53, 71, 54, 72, 03
11/12/86	67, 68, 01, 50, 02
11/13/86	69, 63, 48, 11, 61
11/14/86	10, 47, 60, 64, 76, 62
11/15/86	75, 65, 73, 66, 49, 45
11/16/86	46, 59, 08, 58, 09
11/17/86	43, 07, 44, 55, 40
11/18/86	42, 57, 41, 56
Round 2	
12/8/86	48, 63, 11
12/9/86	61, 62, 47, 60, 46, 59, 40, 55, 08
12/10/86	65, 76, 75, 64, 73, 66
(Base Production Wells)	HW-04, MB-01, K-9, HW-03, MB-04, HW-05, HW-06, HW-01
12/11/86	58, 09, 42, 57, 41, 56, 07, 43
12/12/86	44, 45, 49, 70, 52, 53, 71, A6-01, JT-01
12/13/86	54, 72, 50, 51, 69, 68, 01, 67
12/14/86	02, 03

0.45-micron filter with a glass pre-filter. They then administered any required preservatives and sealed, labeled and immediately stored the sample bottles in iced coolers.

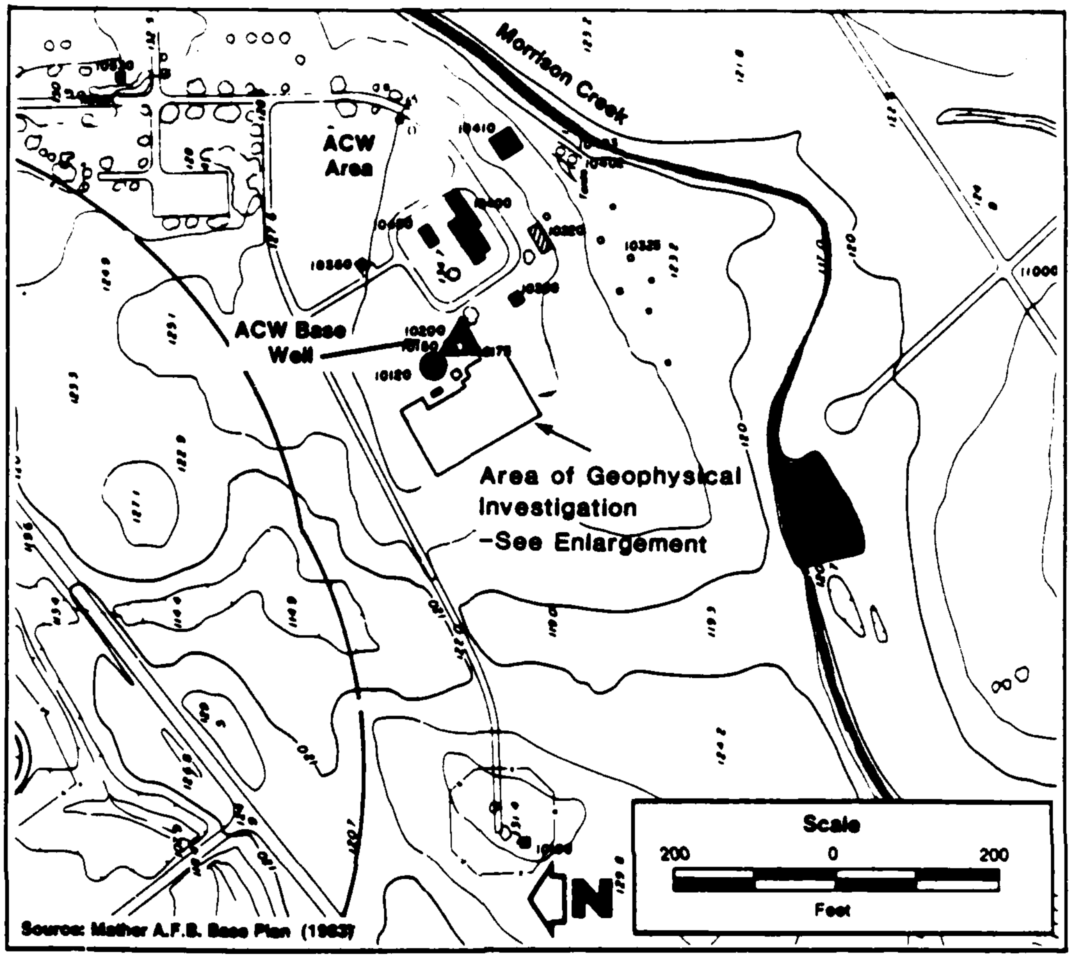
Between well samplings, the sampling crew decontaminated all the sampling equipment. This process included a wash with Alconox detergent, a rinse with drinking-quality water and a second rinse with de-ionized water. We then wrapped the equipment in aluminum foil to ensure cleanliness. The well sampler (i.e., the crew member who handled the sample bailer) wore a new pair of latex surgeon's gloves while sampling each well.

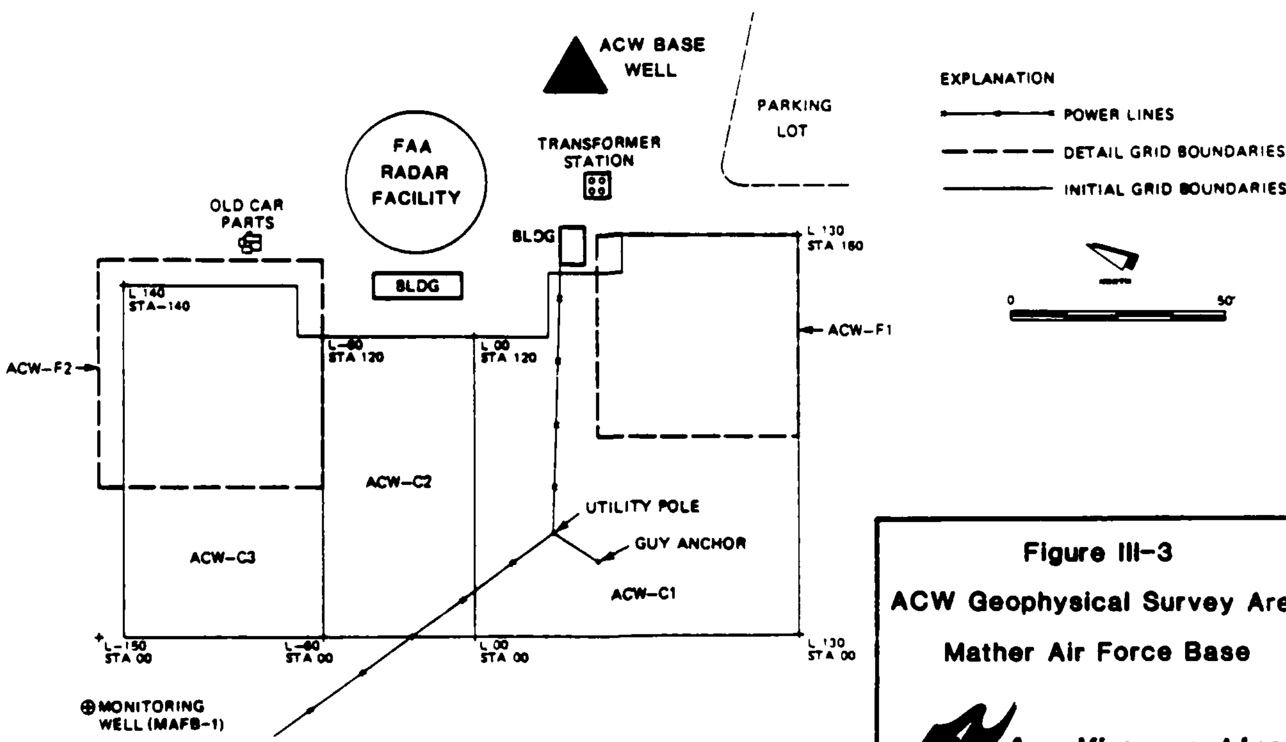
After the day of sampling, the field crew packed the samples, including 10% of the split samples for blind quality assurance analyses, with completed chain-of-custody forms. One field blank was prepared for each sampling round. All samples were shipped with security seals for overnight delivery via Greyhound Bus Lines to Acurex Labs.

3. Geophysical Program

Geophysical surveys were conducted at two Mather AFB sites before drilling began at these sites. Field work was completed between August 18 and August 23, 1986. The objective of the survey at the ACW site was to locate a buried disposal pipe using a magnetometer, pipe locator and ground penetrating radar (Figure III-3). Work at the 7100 Landfill used ground conducting instrumentation to outline the plume of contaminated groundwater flowing away from the site (Figure III-4). AV used the results of these surveys to select optimum locations for groundwater monitoring wells.

The terrain conductivity method employed at the 7100 Landfill site uses the principle of electromagnetic induction to measure soil conductivity and to map changes in conductivity (Driscoll, 1986). Changes in conductivity can be caused by changes in geologic structure (groundwater zones, shallow bedrock and fault/fracture zones) or can be the result of cultural activities (buried pipelines, drums, trenches filled with metal objects, and chemical spills).





See Appendix J for Survey Data and Maps

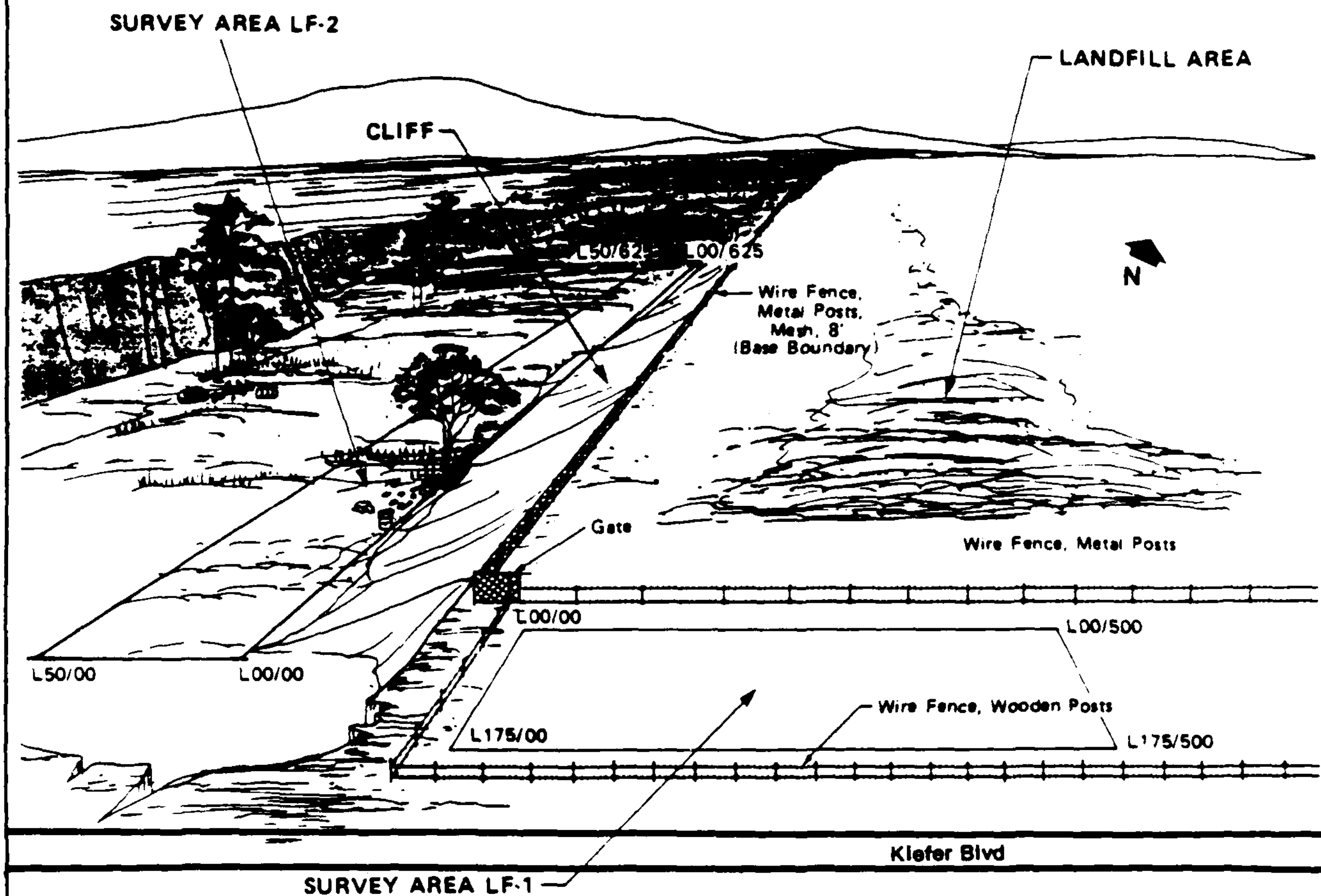
Figure III-3

ACW Geophysical Survey Area

Mather Air Force Base

AeroVironment Inc.

87-76



See Appendix J for Survey Data and Maps

Figure III-4
7100 Disposal Area
Geophysical Survey Area
Mather Air Force Base

AeroVironment Inc.

87-77

The survey used a Geonics EM-34 ground conductivity meter in the horizontal dipole configuration. For this study, Earth Technology collected along profiles at 25-foot intervals for each of three dipole (coil) spacings: 10, 20 and 40 meters (m). The 10, 20 and 40 m coil separations provide nominal effective exploration depths of 7.5, 15, and 30 m, respectively. By taking data at different spacings along a profile, both vertical and lateral variation in conductivity could be observed.

The EM-34 measures conductivity directly in units of millimhos per meter (mmho/m). Earth Technology recorded these data in a notebook in the field and later entered them manually into the computer. They were plotted in contour and/or 3-D form for presentation.

The magnetic profiling at the ACW site used an EDA PPM-500 magnetometer. Earth Technology made readings with the magnetometer sensor at a height of 3 feet above the ground instead of the usual 8 feet. This reduction in height enhanced identification of small, near-surface targets. Earth Technology initially collected data with 10-foot line spacing and 5-foot station spacing on the lines. In areas where anomalies were found, they conducted a more detailed survey using 5-foot line and station spacing. The data were stored in the instrument's memory as each reading was made. When all the readings planned for a grid had been taken, the data were transferred to a floppy disc by interfacing the instrument with a Compaq microcomputer. The reduced data represent the total magnetic field in units of gammas and were presented in contour maps.

Ground-penetrating radar profiling was done with a SIR (subsurface interface radar) System-3 manufactured by G.S.S.I. A 300 mhz antenna was used. GPR profile lines were run 5 feet apart. The output of the GPR system is a continuous analogue profile with vertical lines marking the station location. The purpose of the GPR survey was to pinpoint the disposal pipe within a small area indicated by the magnetometer, as the GPR has a very small "search radius." The depth of investigation was between four and six feet.

4. Electromagnetic Pipe Locator

A Goldak Model TR-5 pipe locator was used for final delineation of target locations. Surveying involved sweeping the unit over the area. Instrument output is an audio tone that changes frequency over a metallic object, thus data are not collected directly by the instrument. Instead, we marked areas of interest on a map (see Appendix J) with pinflags for later reference.

5. Soil Gas Survey

Tracer Research Corporation (TRC) conducted a soil gas survey at the ACW area to define the plume of TCE downgradient and to place monitoring wells in the best locations to monitor the contaminant (see Figure III-5). Portions of the borrow pit just off base at the 7100 Landfill area were also surveyed after a suspicious area (approximately 1/2 acre) of the pit was seen to contain empty 55-gallon steel drums on the surface and because this area emitted an odor of petroleum products. This area is essentially the same area shown as the geophysical survey area in the pit on Figure III-4.

TRC used an analytical field van equipped with one Varian 3300 gas chromatograph, one Tracer 540 gas chromatograph, and two Spectra Physics SP4270 computing integrators. A gas chromatograph equipped with an electron capture detector was used to analyze TCA, TCE and PCE. The van has two built-in gasoline-powered generators that provide the electrical power (110 volts AC) to operate all of the gas chromatographic instruments and field equipment. A specialized hydraulic mechanism consisting of two cylinders and a set of jaws was used to drive and withdraw the sampling probes, which consisted of seven-foot lengths of 3/4-inch diameter steel pipe fitted with detachable drive points. A hydraulic hammer assisted in driving probes past cobbles and through unusually hard soil.

TRC collected soil gas samples by driving a hollow steel probe from 1 to 5.5 feet into the ground. The aboveground end of the sampling probes were fitted with a steel reducer and a length of polyethylene tubing leading to a vacuum pump. Five to ten liters of gas were evacuated with a vacuum pump.

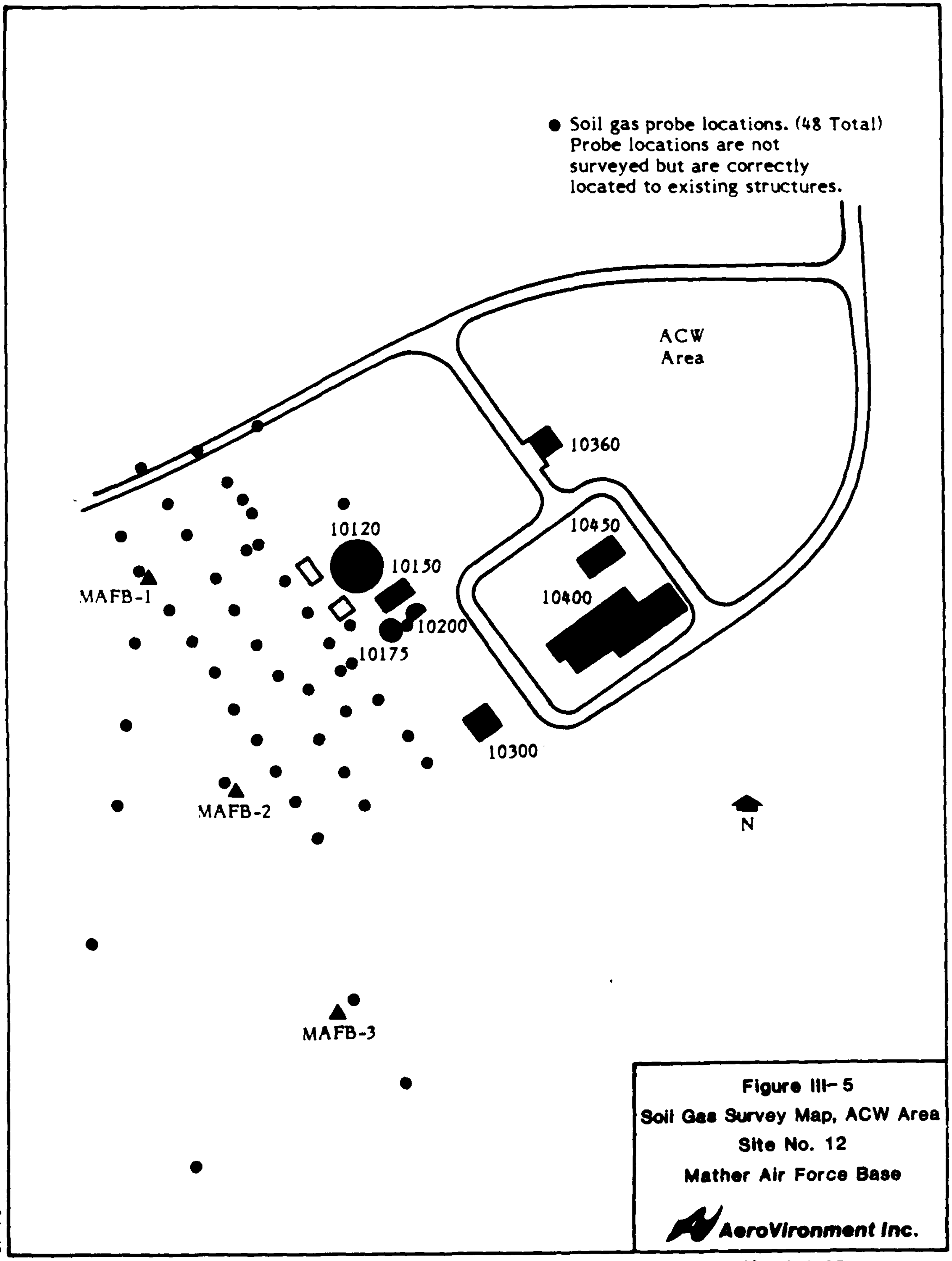


Figure III-5
Soil Gas Survey Map, ACW Area
Site No. 12
Mather Air Force Base

AeroVironment Inc.

87-75

March 1987

During the soil gas evacuation, TRC collected samples by inserting a syringe needle through a silicone rubber segment in the evacuation line and down into the steel probe. Ten milliliters of gas were collected for immediate analysis in the TRC analytical field van. Soil gas was subsampled (duplicate injections) in volumes ranging from 1 µl to 2 ml, depending on the VOC concentration at any particular location. Soil gas data are found in Appendix Q.

The investigation resulted in a total of 59 soil gas samples, which were analyzed for the following compounds:

1, 1, 2 - Trichlorotrifluoroethane
1, 1, 1 - Trichloroethane (TCA)
Trichloroethene (TCE)
Tetrachloroethene (PCE)

None of these compounds were detected in the soil.

6. Laboratory Interface

All samples collected at Mather AFB were analyzed at Acurex Corporation's Energy & Environmental Division. Acurex's Analytical Laboratory is certified by the California Department of Health Services and is a contract laboratory for the U.S. Environmental Protection Agency.

Samples collected at Mather AFB were shipped via Greyhound bus and delivered to the laboratory overnight. Whenever possible, AV contacted the lab the morning after sample shipment to confirm receipt. All chain-of-custody documents were checked against samples received by the laboratory sample custodian, who signed each form and returned them to AV.

AV's field personnel maintained close communication with laboratory personnel throughout the field program: (1) to ensure all samples shipped to the laboratory had arrived in good condition, (2) to coordinate sampling activities with the laboratory to make sure samples were able to be processed within specified holding times, and (3) to identify errors in sampling, preservation or analysis quickly, so that they could be rectified. In addition, AV personnel visited the laboratory on several occasions to meet with laboratory personnel to discuss analytical methods, check on the disposition of samples, resolve potential

problems, verify quality assurance procedures, and validate data reporting. AV continually reviewed analytical data and identified errors and inconsistencies, all of which were quickly resolved by the laboratory. The goal was to produce a data package which was accurate and error-free.

C. Field Instruments (Measuring Devices)

Conductivity measurements were made with a Geonics EM-34 terrain conductivity meter. The instrument's transmitting and receiving coils act as magnetic dipoles. Small amplitude eddy currents are induced in the ground when alternating current is applied to the transmitter coil. The receiver coil detects the secondary magnetic fields caused by the eddy currents. The ratio of the received signal to the transmitter's primary field is proportional to the soil conductivity. Field measurements are rapid, because no direct connection with the ground is required.

The depth of penetration is independent of terrain conductivity and is determined solely by the intercoil spacing and coil orientation. Three fixed spacings of 10, 20, and 40 meters can be used with the coils in the horizontal mode, and the instrument can sense to a depth 1.5 times the intercoil spacing. For the vertical mode, depth of penetration is .75 times the intercoil spacing. The meter's sensitivity is <0.2 micromhos per meter.

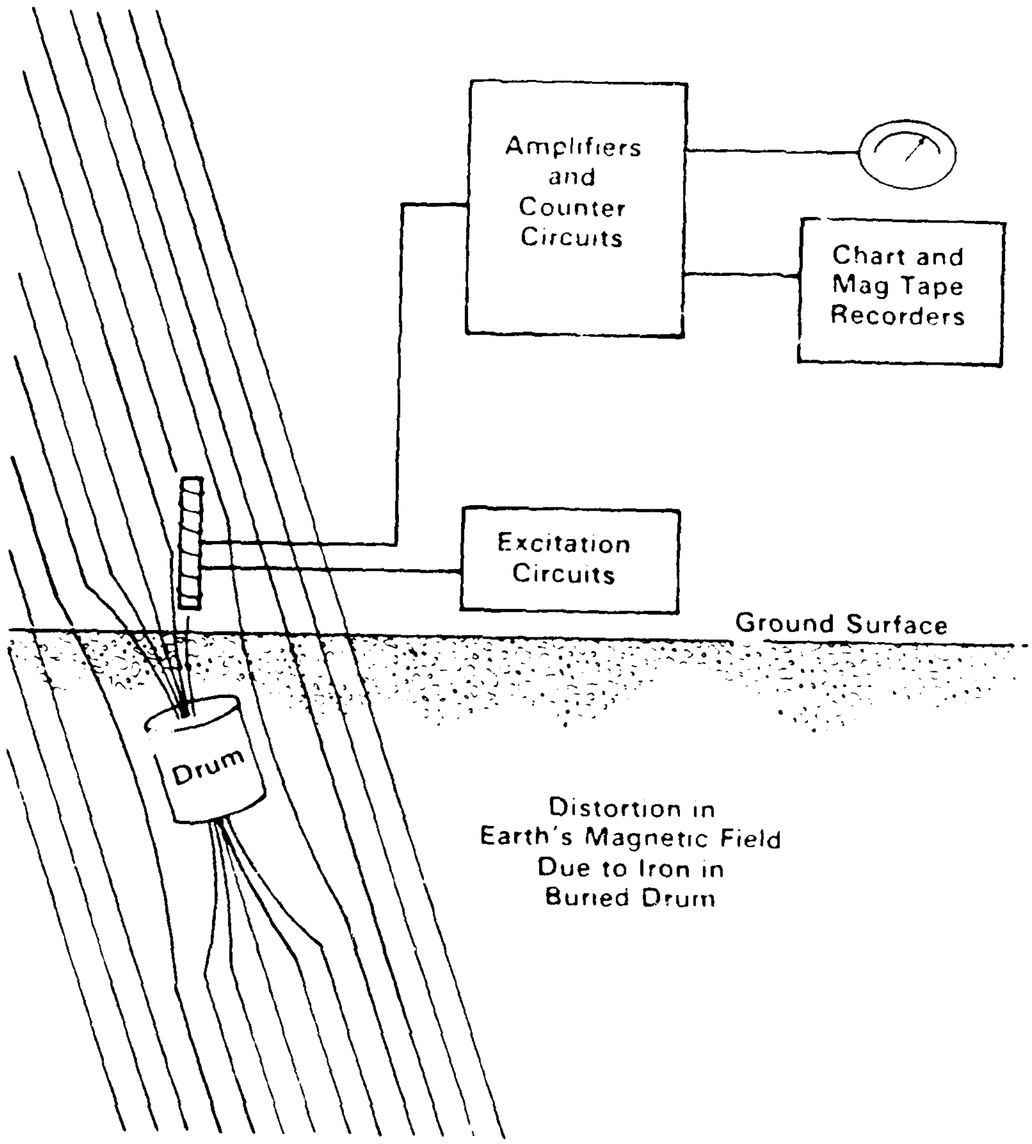
Ground-penetrating radar data were taken with a Geophysical Survey System SIR System 3 ground-penetrating radar. Impulse radar radiates repetitive, short time-duration electromagnetic pulses into the earth from a broad bandwidth antenna placed close to the ground surface. The equipment functions as an echo-sounding system using radar pulses of only a few nanoseconds to detect and measure the location and depth of reflecting discontinuities in subsurface soils. Continuous profiles are generated by towing the antenna along the profile and displaying the reflected radar signals on a graphic recorder. The effective penetration depth at these sites was between four and six feet.

Magnetic profiling was accomplished with an EDA PPM-500 magnetometer. This device senses pertubations in the earth's magnetic field generated by buried ferromagnetic objects. An induced magnetization is produced in any magnetic material within the earth's magnetic field, and this induced field is superimposed on the geomagnetic field. If strong enough, this induced field produces a localized anomaly in the geomagnetic field (Figure III-6). As the magnetometer is carried across the area of interest, variations in the geomagnetic field affects the movement of subatomic particles within the instrument. From these motions, it is possible to infer the magnitude of the geomagnetic anomaly.

A Goldak Model TR-5 pipe locator was used for final delineation of target locations. Surveying involved sweeping the unit over the area of interest. Instrument output is an audio tone that changes frequency over a metallic object, thus the instrument does not collect or record data.

During the drilling phase, a gas alarm (O_2/explosimeter) was always on site to ensure that the ambient air remained at an acceptable oxygen level. The drill hole and drill cuttings were monitored with an organic vapor analyzer (OVA) that measures the presence of organic vapors. The Gastech Protector Model 1562 Portable Gas Alarm used during this phase of the Mather AFB project can detect and indicate combustible gas concentrations up to the lower explosive limit. If the gas concentration exceeds a preset level, it emits a characteristic audible signal. It also analyzes for oxygen over the range of 16 to 22% and emits a different signal if the oxygen concentration drops below a preset level. Combustible gas is detected by a diffusion head containing a catalytic element. Oxygen is detected by an electrochemical oxygen cell installed in the same head with the combustibles detector.

The Foxboro Century Model 128 organic vapor analyzer (OVA) portable flame ionization detector used is sensitive to organic vapors delivered to it by means of a diaphragm pump. It is extremely sensitive and monitors total organic vapors to parts per million (ppm) levels. The detector is composed of a hydrogen delivery system, a sample delivery system, and an electronic amplification and display system. In the survey mode, the air sample is delivered continuously to the



Source: U.S. EPA EMSL, 1982.

Figure III-6

Diagram of Magnetometer System

Mather Air Force Base

AeroVironment Inc. • MONROVIA, CA

AD-A194 900 INSTALLATION RESTORATION PROGRAM PHASE 2 CONFIRMATION/QUANTIFICATION STAGE 3(U) AEROVIRONMENT INC MONROVIA CA 05 FEB 88 AV-FR-86/596 2/10

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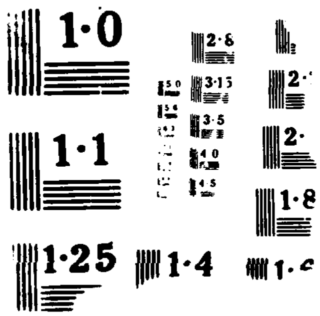

1·0
1·1
1·25
1·4
1·8

detector chamber. When an organic vapor is exposed to the hydrogen flame via the air flow, the molecules ionize and a current is carried between the detector electrodes. The current is proportional to the concentration of the vapor in the sample. Different compounds will ionize to varying extents in the flame, so the meter's response for a given compound is expressed relative to a standard (methane). The OVA was calibrated on a daily basis, using a known methane standard and background air.

The Powers Electric Company Well Sounder is a 200-foot probe cable labeled at 5-foot intervals to monitor the depth at which the top of the water table is encountered. The end of the cable consists of two electrical probes connected by one foot of lead weights. When both probes are submersed in groundwater, an electrical circuit is completed and the meter registers in milliamperes.

During groundwater sampling, pH and conductivity meters were used to characterize the sample water. The Orion Research Model 211 digital pH meter uses a combination electrode probe to determine the acidic or basic properties of the sample water. The system was calibrated daily with two buffer solutions and the probe was decontaminated with deionized water after each use.

The Horizon Ecology Type 1840-10 conductivity meter, a self-contained dip-style probe with tungsten electrodes, measures total ionized substances in solution. The meter displays conductivity from 0 to 20,000 micromhos/cm in five ranges. The temperature compensation is automatically corrected to 20°C by an internal thermistor network in the probe. It was decontaminated with deionized water after each use.

The Geotech 2.4-liter barrel filter is a pressure filtration unit that filters all particles of sizes down to 0.45 microns. During filtration, the barrel is sealed and gradually pressurized to pressures not exceeding 40 psi. Before reaching the 0.45-micron filter, the sample goes through a fiberglass prefilter to sieve out large particles. This instrument was decontaminated after every use.

D. Daily Activities

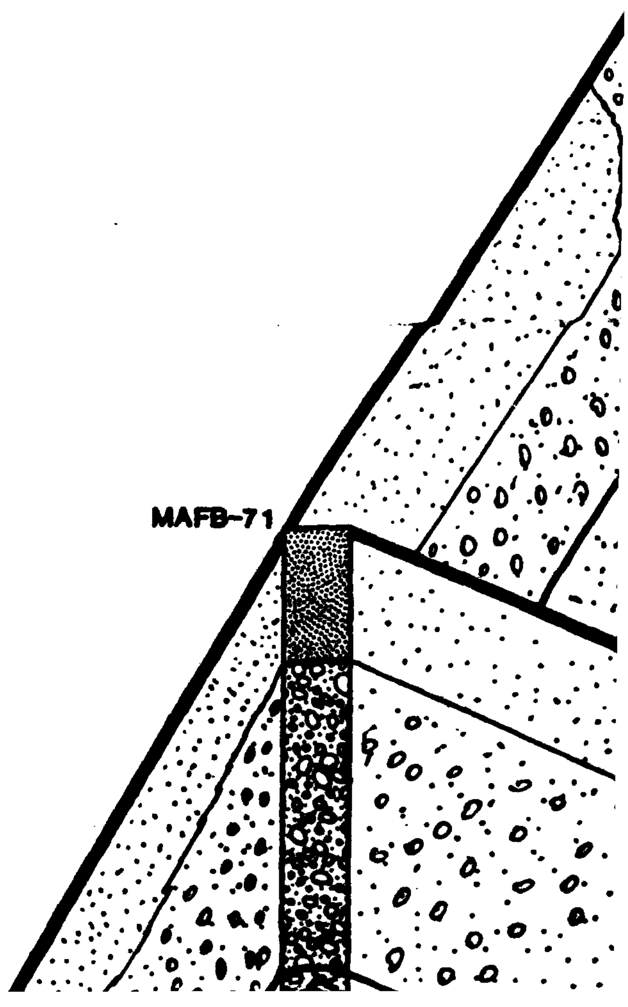
The daily activities are summarized in Table III-1 and Table III-4. A more detailed daily log is found in Appendix L.

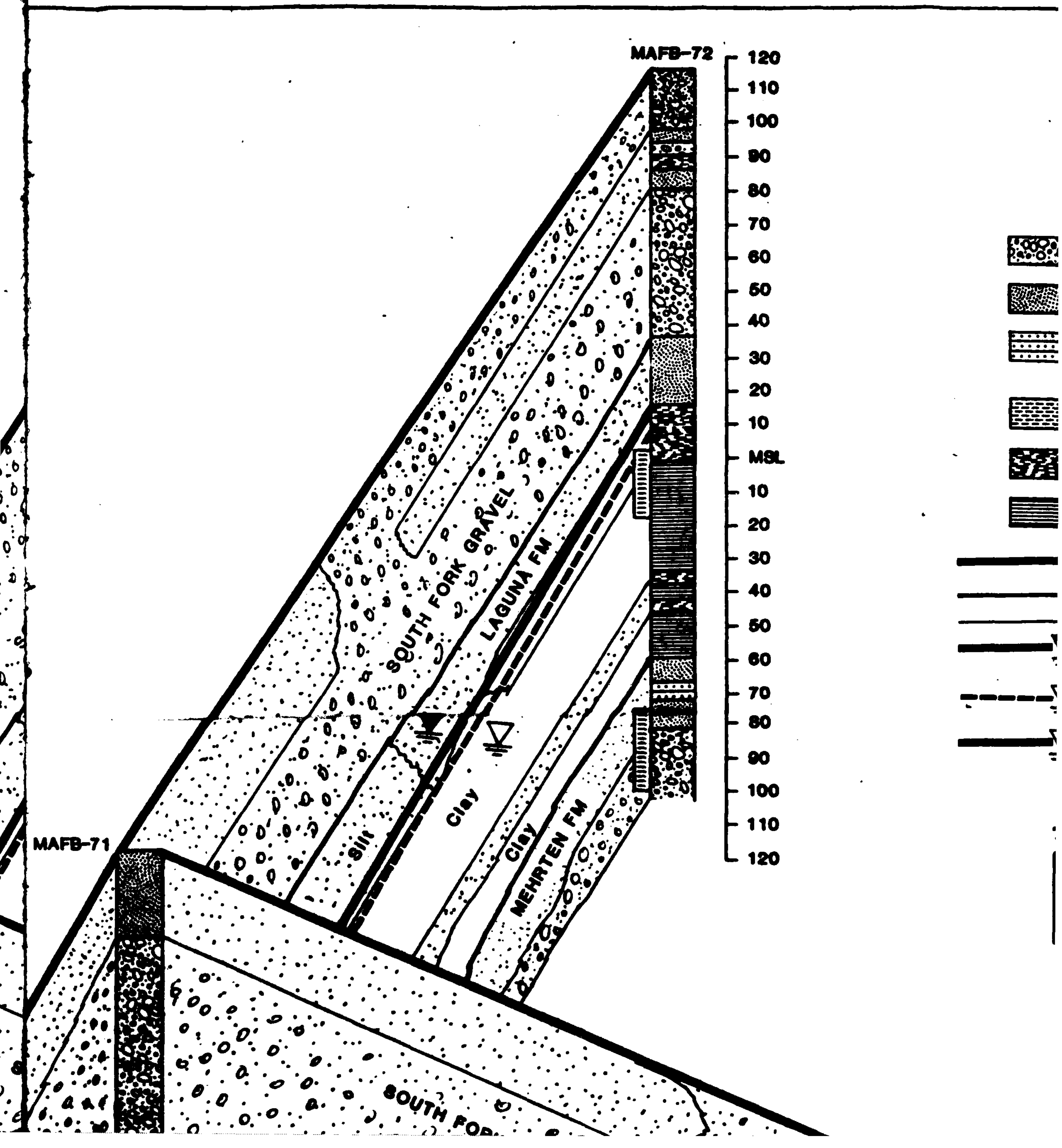
E. Quality Assurance Program

To assure the quality of the measurement data, a sampling and analysis quality assurance/quality control (QA/QC) program was implemented. The objectives of this program were:

- To monitor the precision of the sampling program by comparing blind field duplicate data with laboratory duplicate QC data.
- To monitor the integrity of the analytical data. Field quality control samples were blind in order to eliminate the potential for laboratory bias.
- To monitor the sampling methods for evidence of sample contamination through the use of field blanks.
- To identify and minimize sources of error in the sampling program.

A more complete description of the quality assurance program is found in Appendix M.


MAFB-71



MAFB-72
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MSL
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110
120
MAFB-71
SOUTH FORK GRAVEL
LAGUNA FM
Silt
Clay
Clay
MEHRTEN FM

Gravel

Sand

Interbedded Silt and Sand
or Silty Sand

Silt

Silty Clay

Clay

Ground Surface

Formation Contacts

Lithologic Contacts

Water Level in Unconfined Aquifer

Piezometric Surface in Confined Aquifer

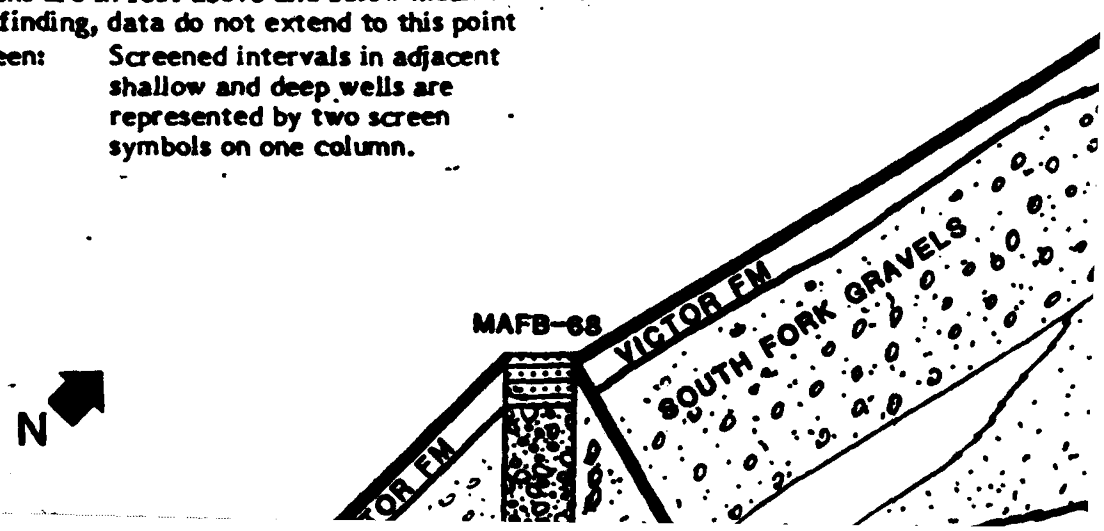
Perched Water

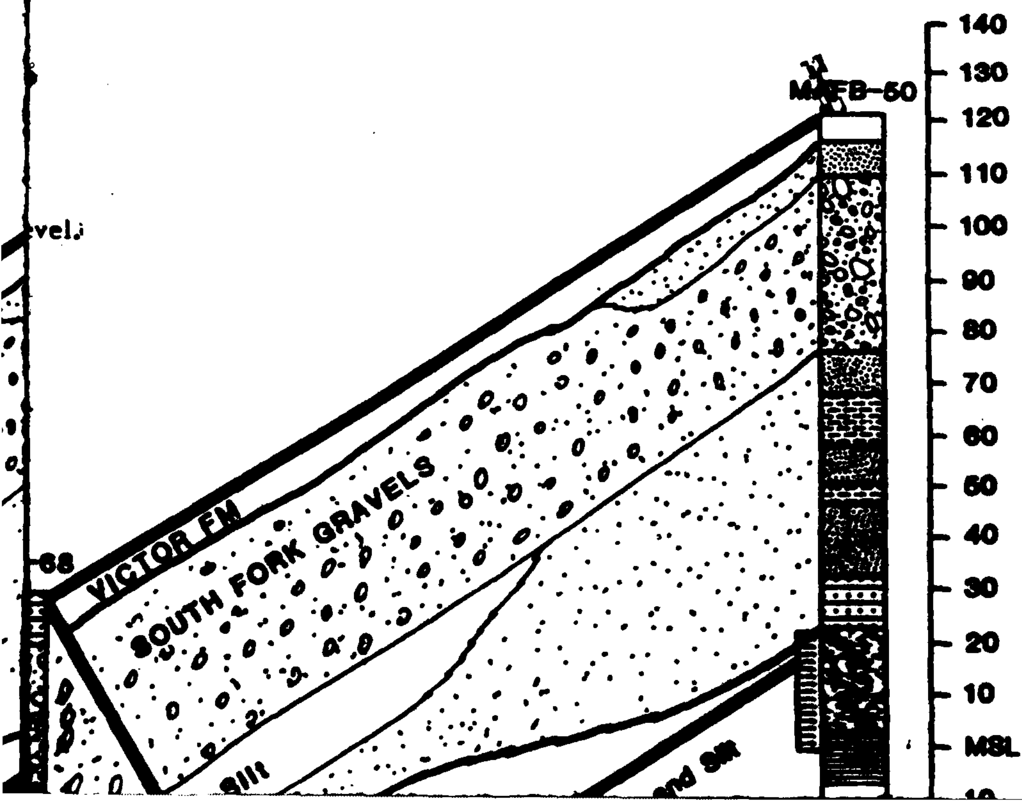
MSL: Mean Sea Level

Dimensions are in feet above and below mean sea level.

? Inferred finding, data do not extend to this point

Well Screen: Screened intervals in adjacent shallow and deep wells are represented by two screen symbols on one column.





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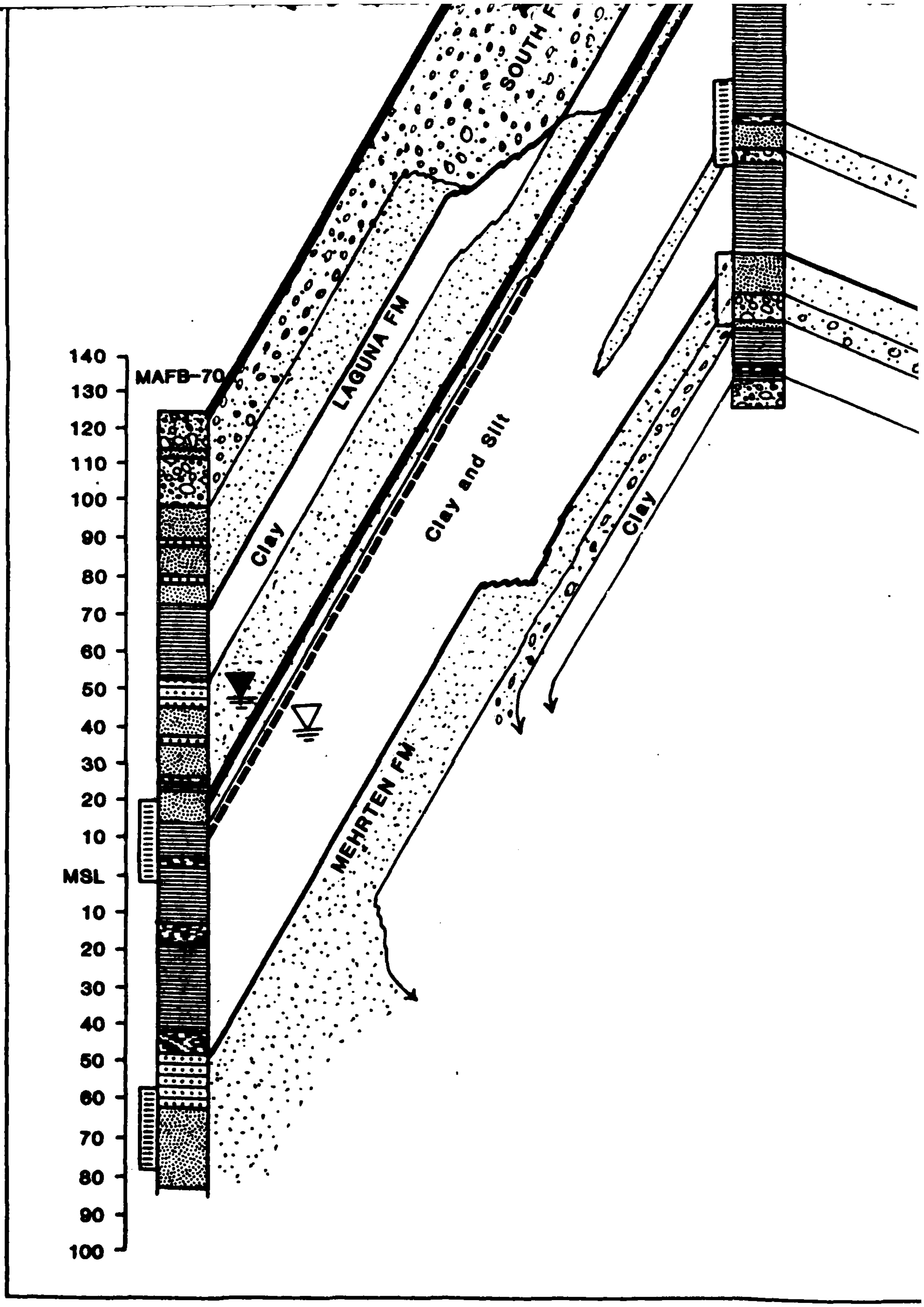
VICTOR FM
SOUTH FORK GRAVELS
Silt
and Silt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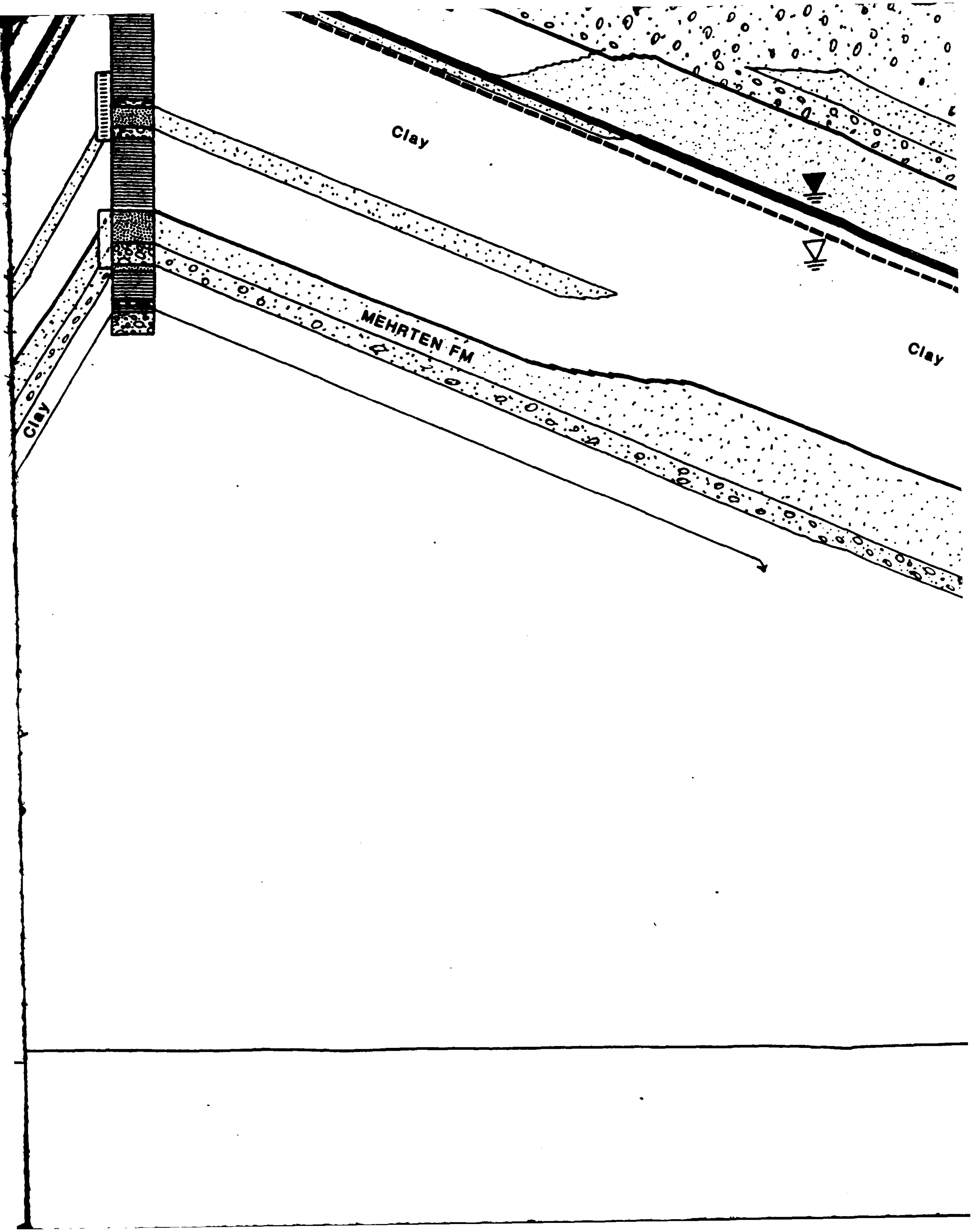
80
90
100
MAFB-70
SOUTH F
LAGUNA FM
Clay
Clay and Silt
Clay
MEHRTEN FM



Clay
MEHRTEN FM
Clay
Clay

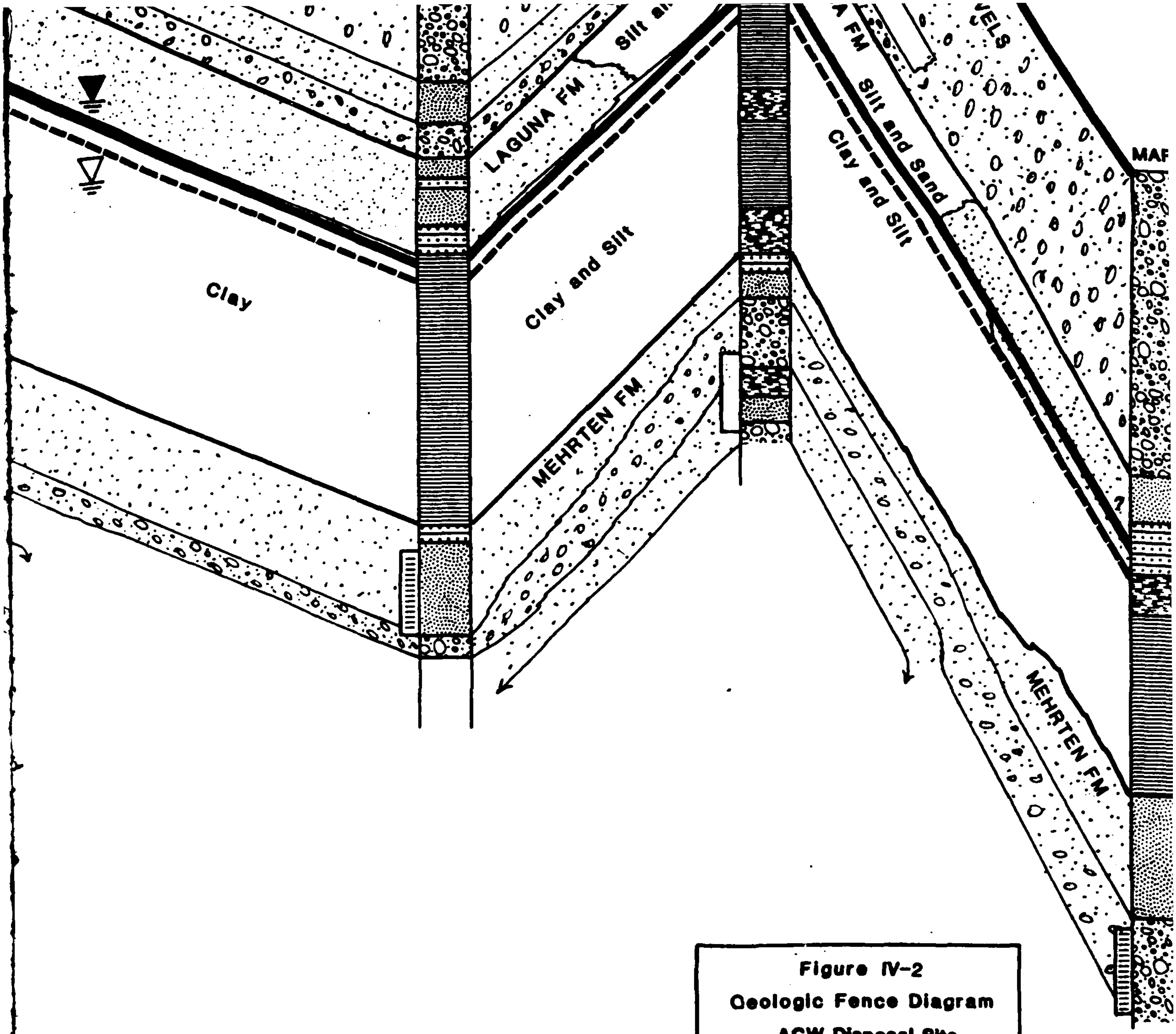


Figure IV-2
Geologic Fence Diagram
ACW Disposal Site
Mather Air Force Base

AeroVironment Inc.

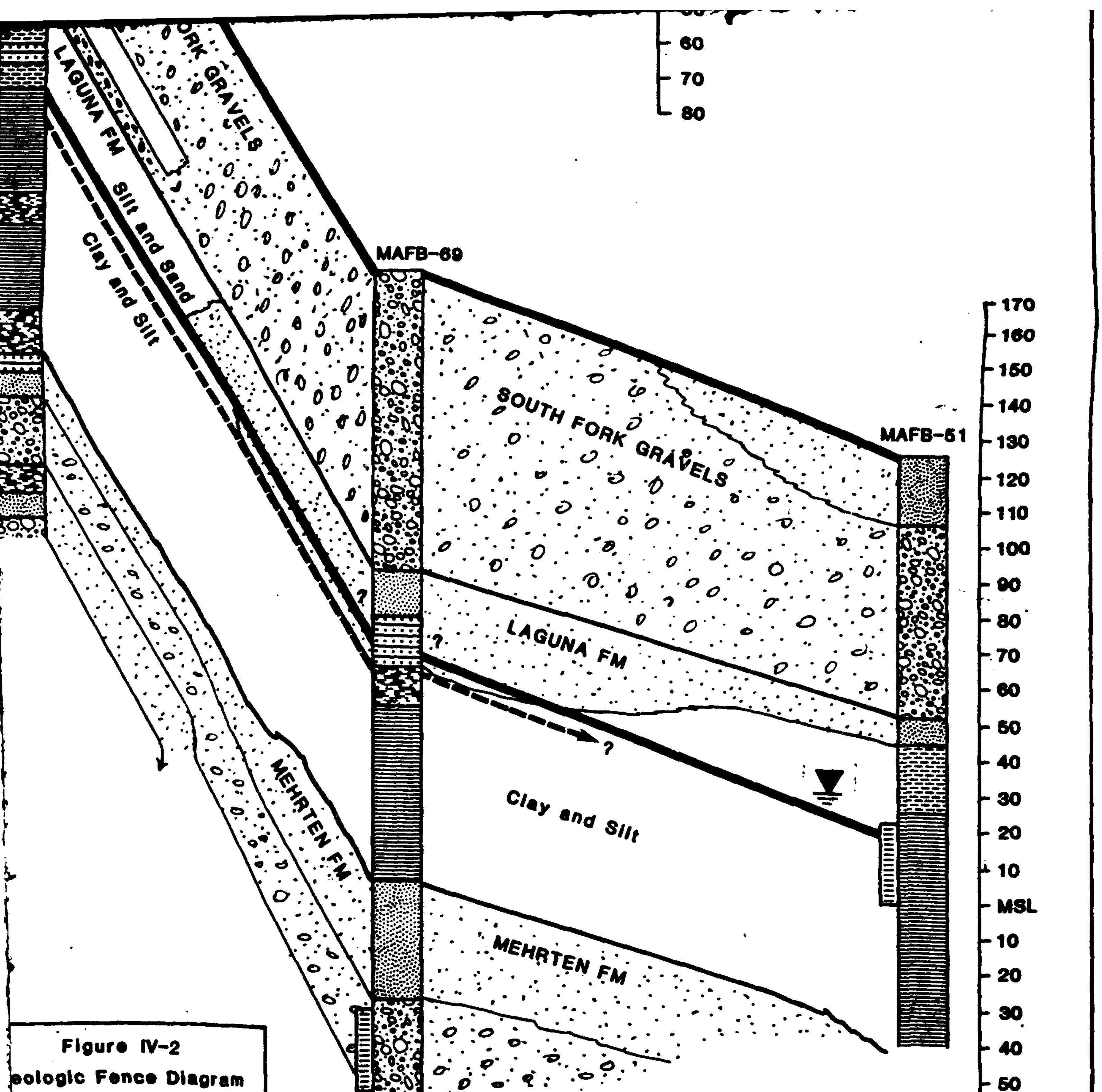


Figure IV-2
eologic Fence Diagram
ACW Disposal Site
Mather Air Force Base
AeroVironment Inc.
March 1987

IV. DISCUSSION OF RESULTS AND SIGNIFICANCE OF FINDINGS

A. Discussion of Results

1. Geology

Mather AFB is on the eastern edge of the Sacramento Valley. The terrain is gently rolling hills with elevations ranging from 60 feet above sea level in the southwest to 160 feet in the northeast. The formations encountered during our drilling program were deposited as outwash from streams that originated in the Sierra Nevada Mountains to the east (CDWR, 1978). They gently dip toward the center of the valley to the west.

Cross-sections and fence diagrams (three-dimensional cross sections) have been generated from the drilling data to illustrate the stratigraphy found beneath the base. Figure IV-1 shows the locations of the sections drawn for Mather AFB; Figures IV-2, IV-3, IV-4 and IV-5 are the cross-sections themselves. The cross-sections were drawn using information from the boring logs included in Appendix D.

The uppermost unit is the Victor Formation. It is an unconsolidated conglomerate with variable amounts of clays, silts, and gravels. Generally, it is present as silty sands and gravels with occasional clay or gravelly clay zones. The Victor Formation was found in the western half of the base, and isolated outcrops were found in the northeast corner. In most areas, a hard pan had developed two to three feet below the surface. This greatly reduces the potential for infiltration of water from the surface except in areas such as landfills, where the ground has been disturbed.

The South Fork Gravels are ubiquitous at Mather AFB. These gravels, found directly beneath the Victor Formation, were deposited by the South Fork of the ancestral American River (CDWR, 1978). As the name suggests, the material is mainly pebble to cobble size with medium to very coarse sand. Occasional zones of cemented sands were found in with the gravels, which may

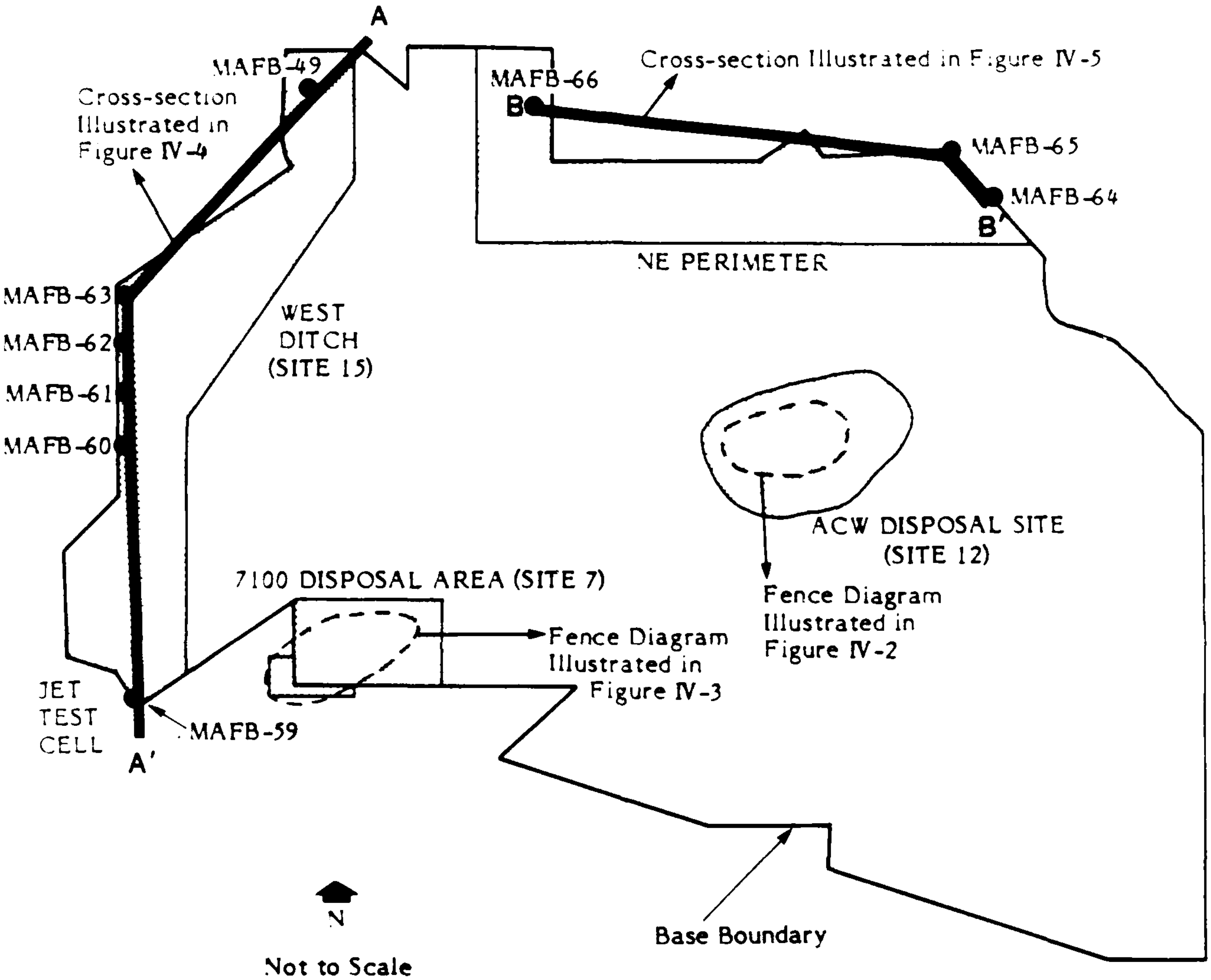


Figure IV-1
Location Map of Investigation Sites and Geologic Cross-sections Mather Air Force Base

AeroVironment Inc.

March 1987

87-83-1

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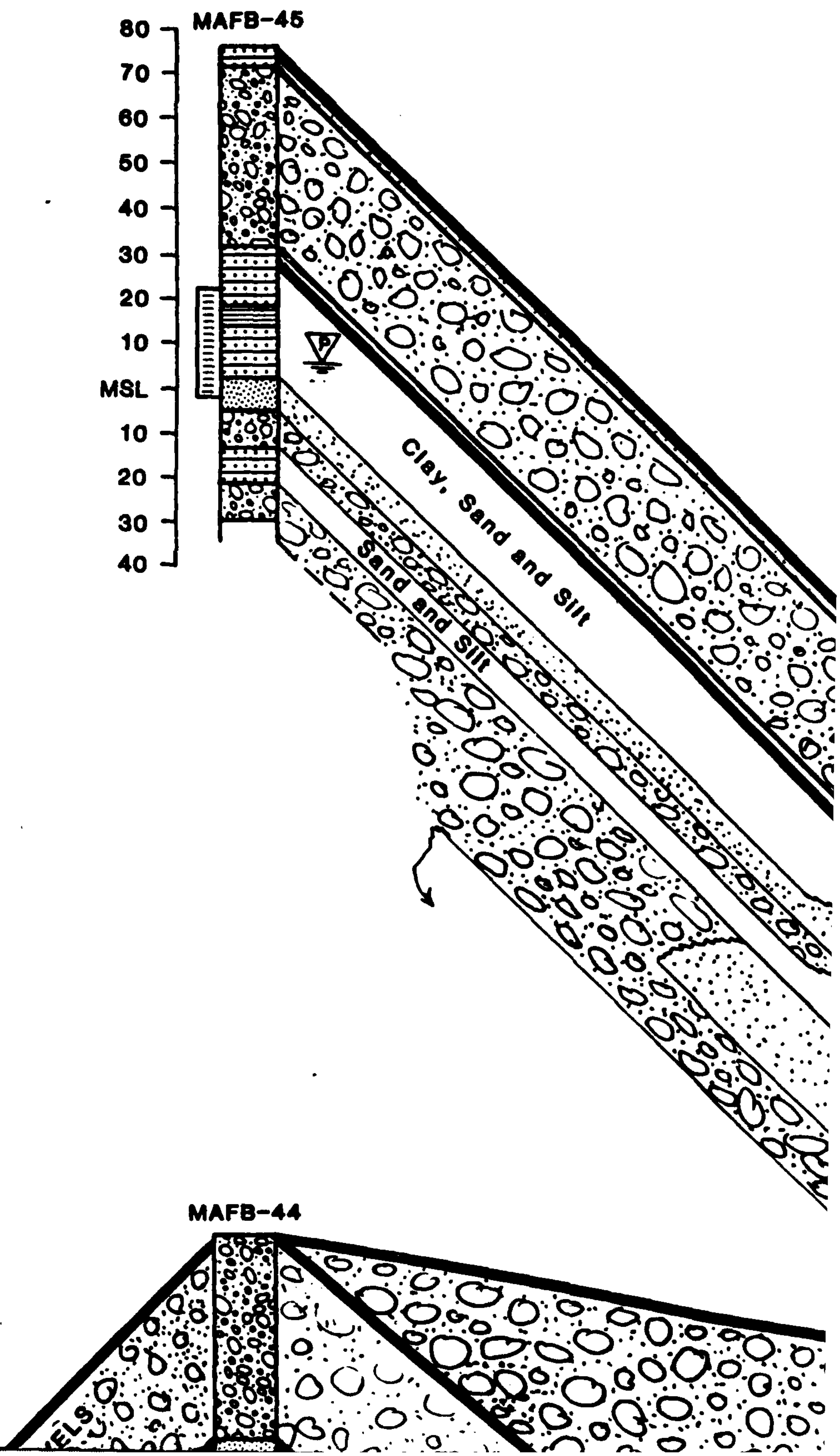

MAFB-45
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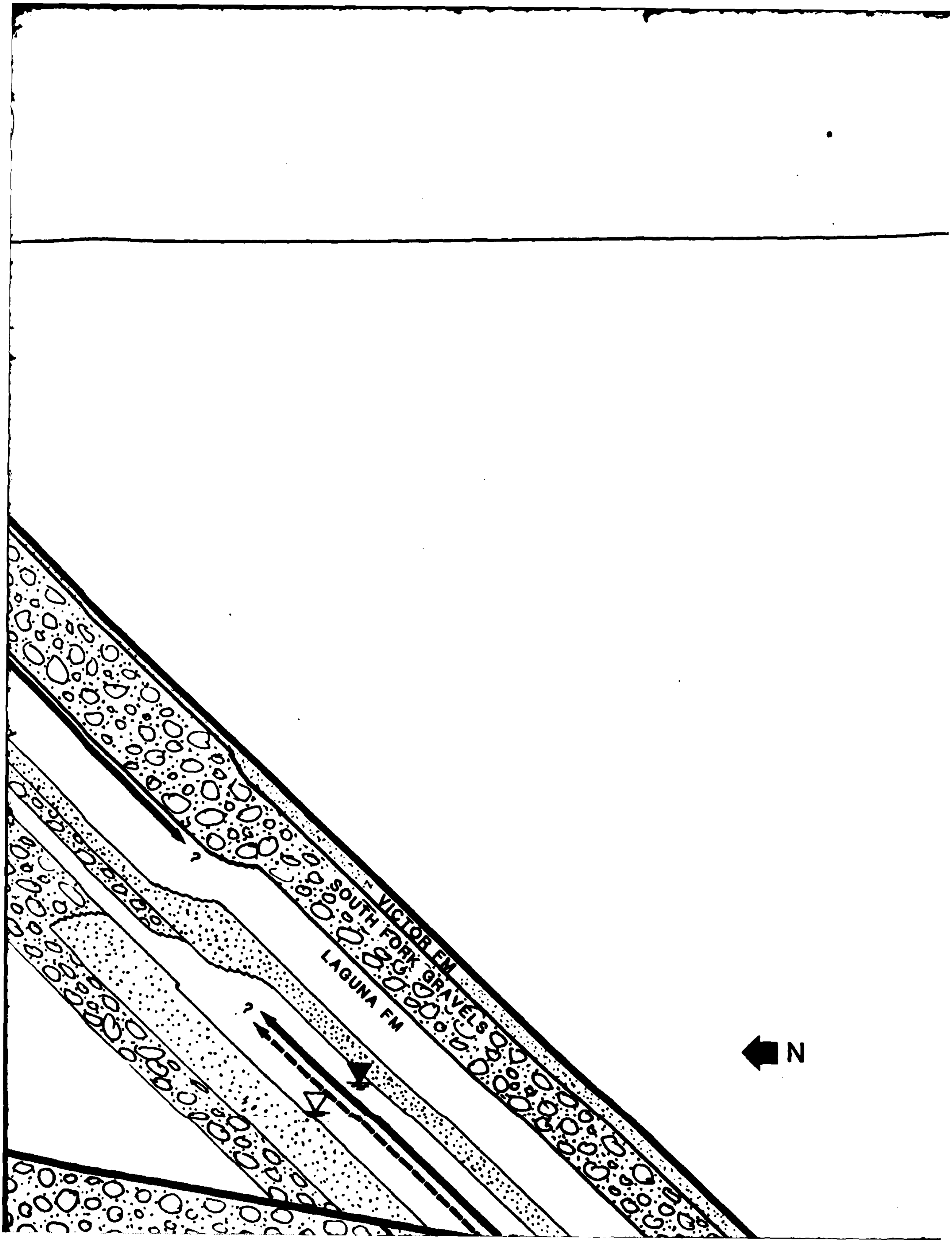
Clay, Sand and Silt
Sand and Silt
MAFB-44


VICTOR FM
SOUTH FORK GRAVELS
LAGUNA FM
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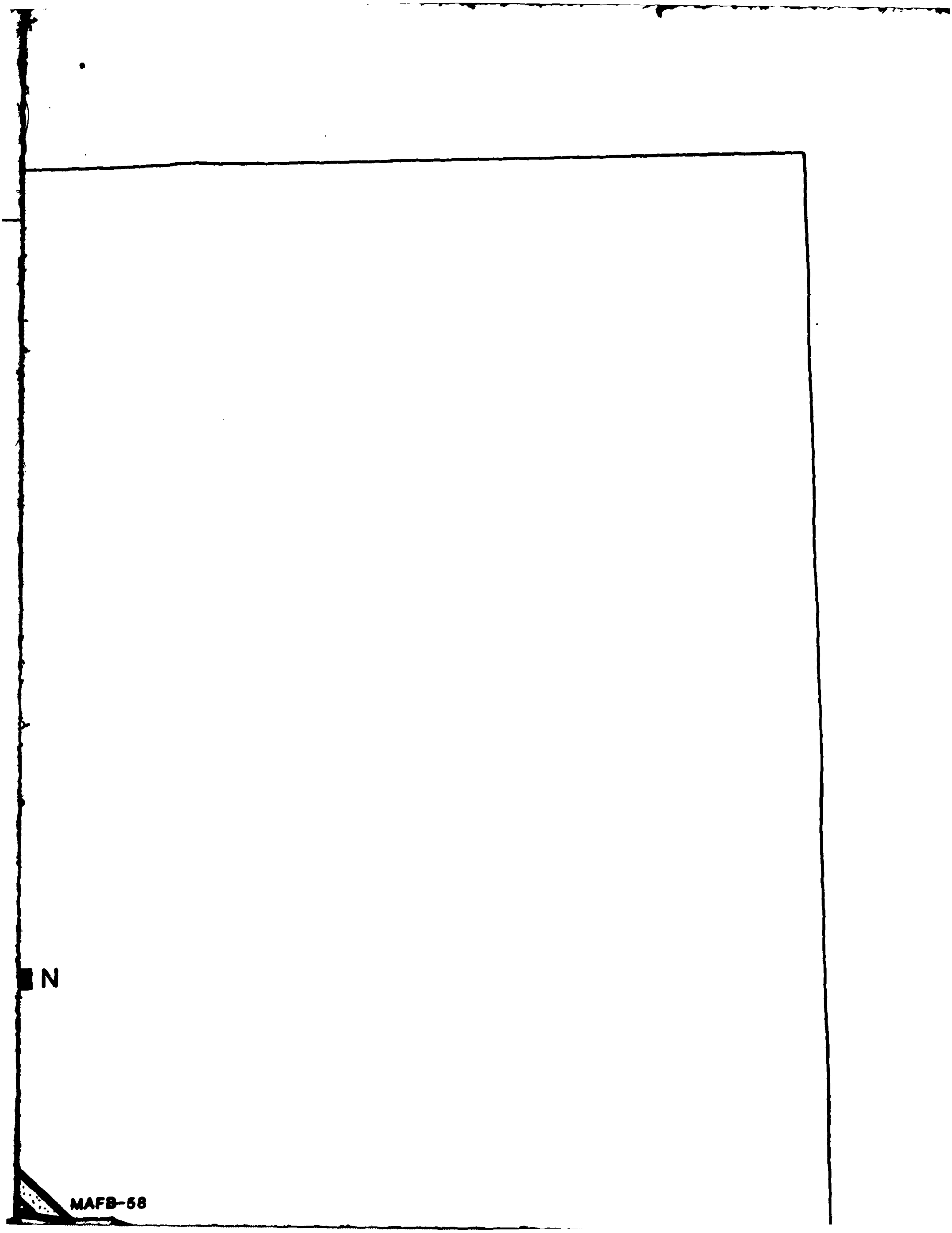
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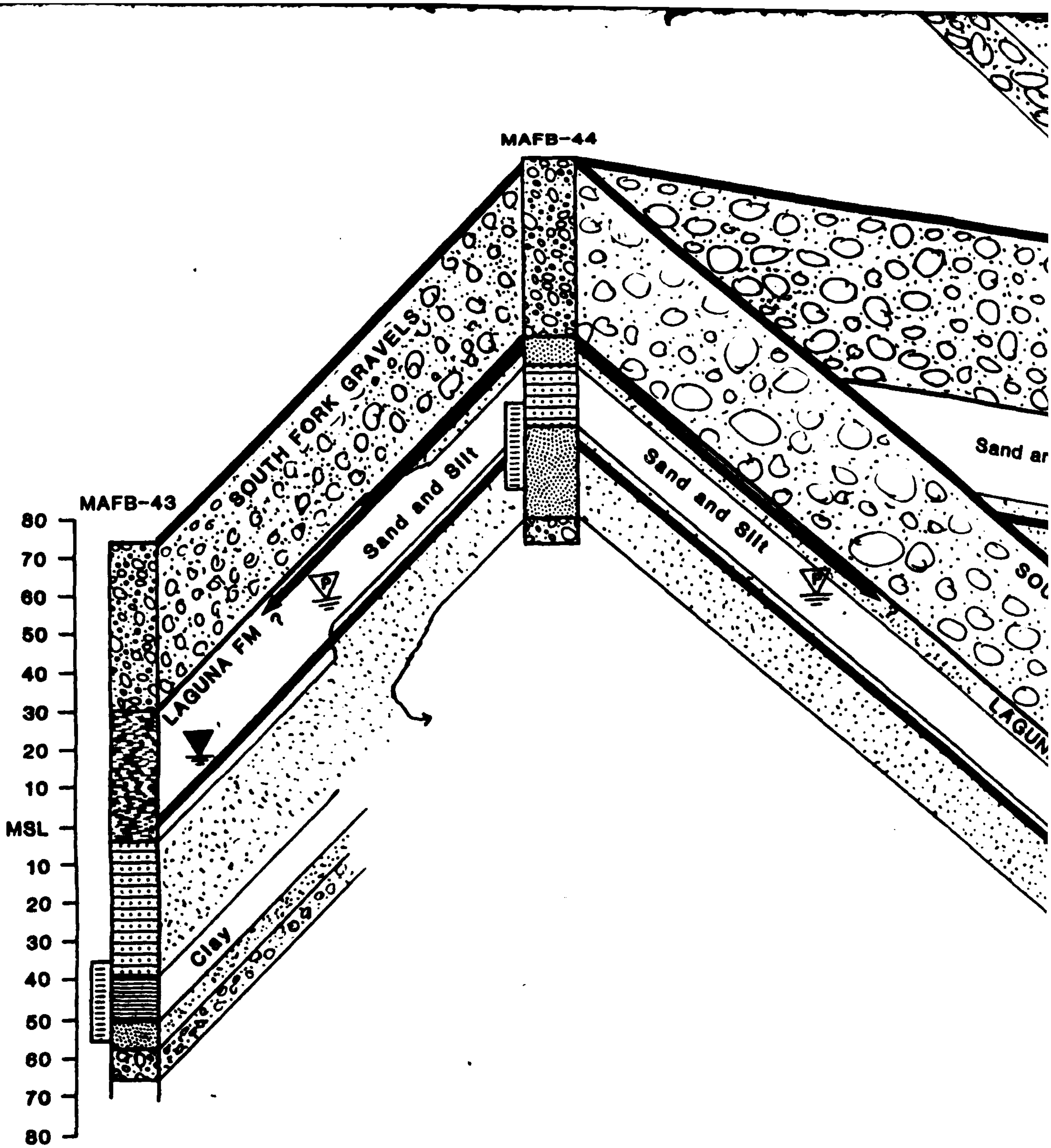

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MAFB-43
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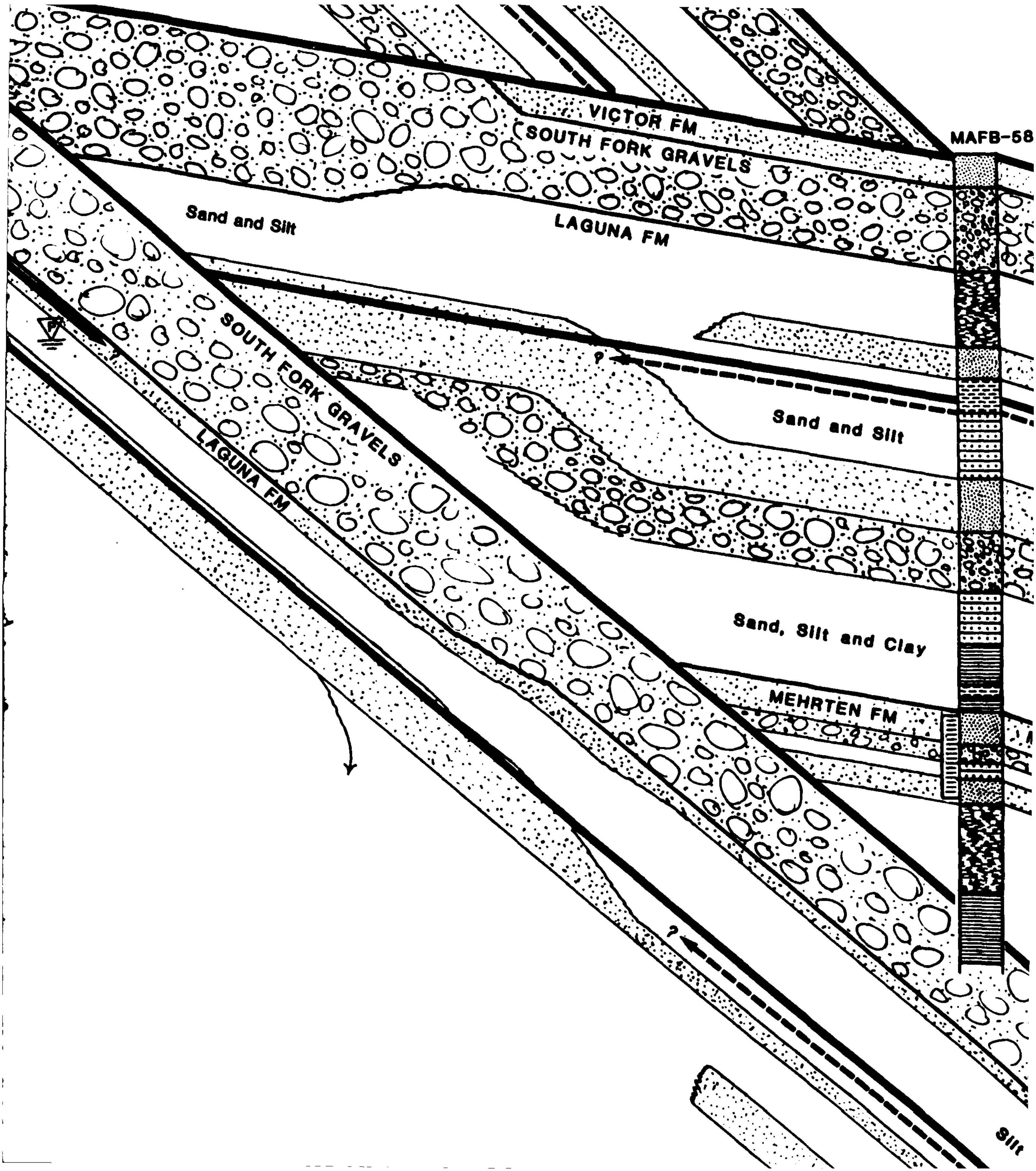

VICTOR FM
MAFB-58
SOUTH FORK GRAVELS
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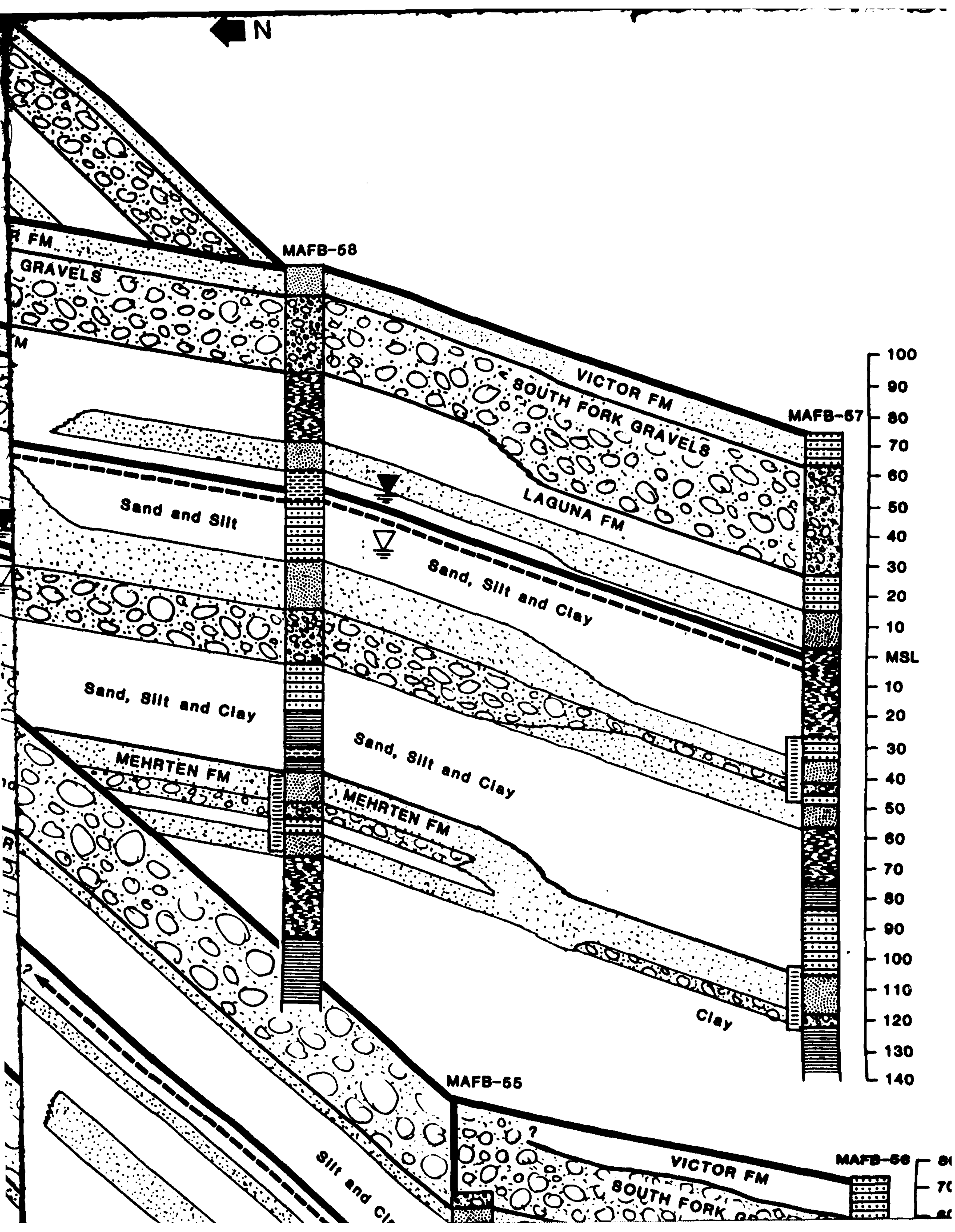
Sand and Silt
Sand, Silt and Clay
MEHRTEN FM
Silt



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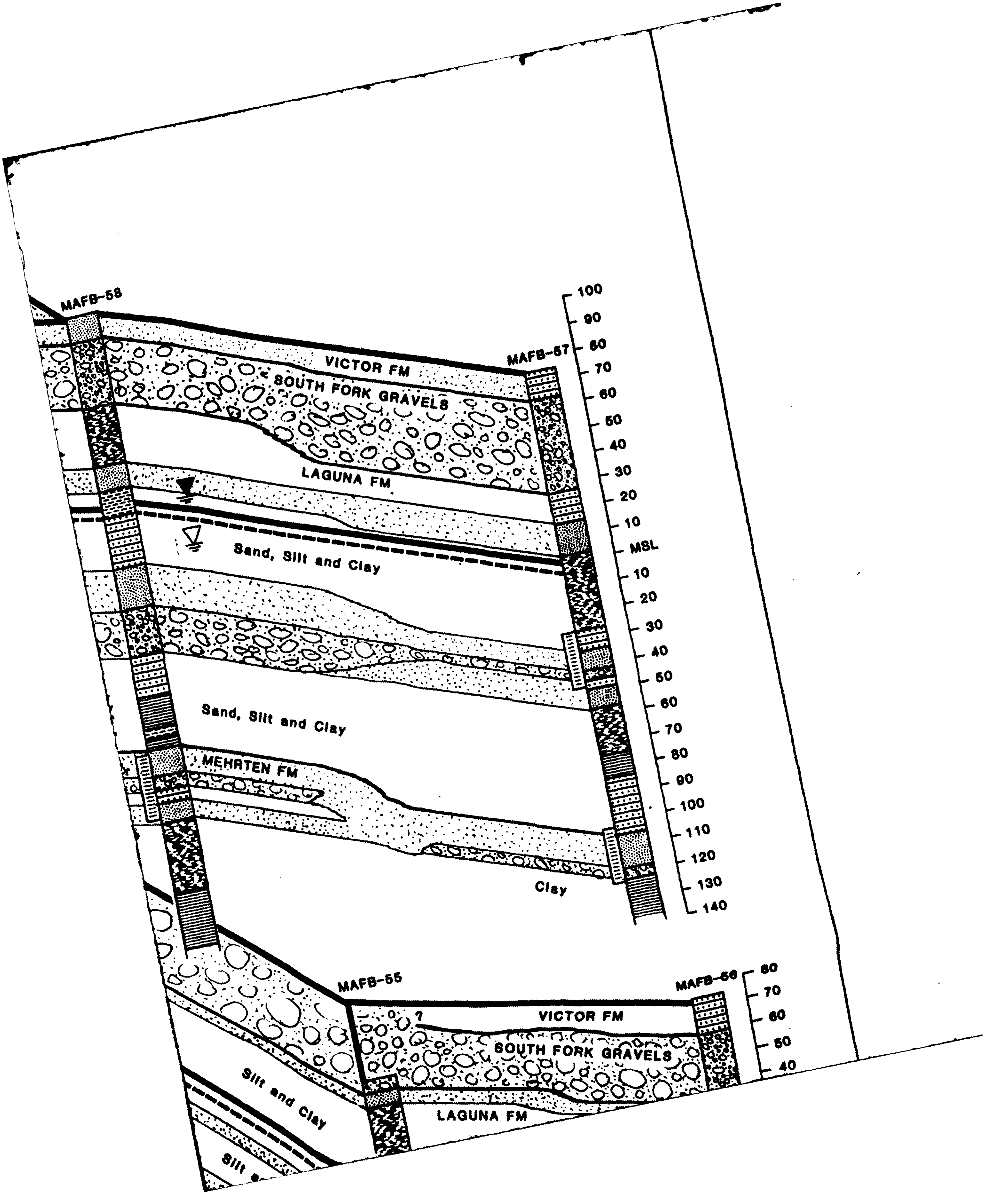

MAFB-58
MAFB-57
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Sand, Silt and Clay
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MAFB-56
VICTOR FM
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LAGUNA FM
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Gravel

Sand

Interbedded Silt and Sand
or Silty Sand

Silt

Silty Clay

Clay

Ground Surface

Formation Contacts

Lithologic Contacts

Water Level in Unconfined Aquifer

Piezometric Surface in Confined Aquifer

Perched Water

MSL: Mean Sea Level

Dimensions are in feet above and below mean sea l

? Inferred finding, data do not extend to this point

Well Screen: Screened intervals in adjacent shallow and deep wells are represented by two screen symbols on one column.

Figure IV-3
Geologic Fence Diagram
7100 Disposal Area
Mather Air Force Base

AeroVironment Inc.

:nd

nfined Aquifer

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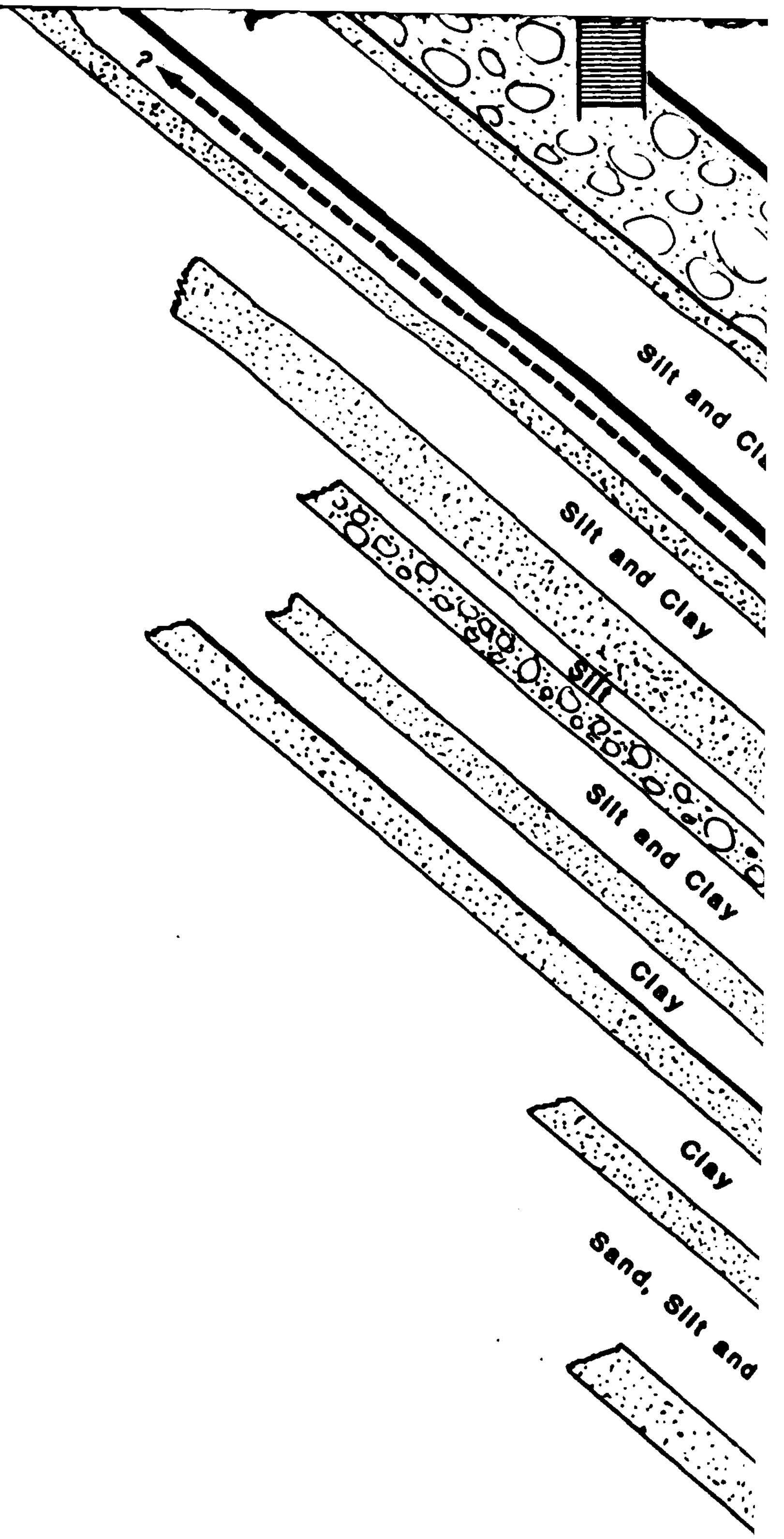

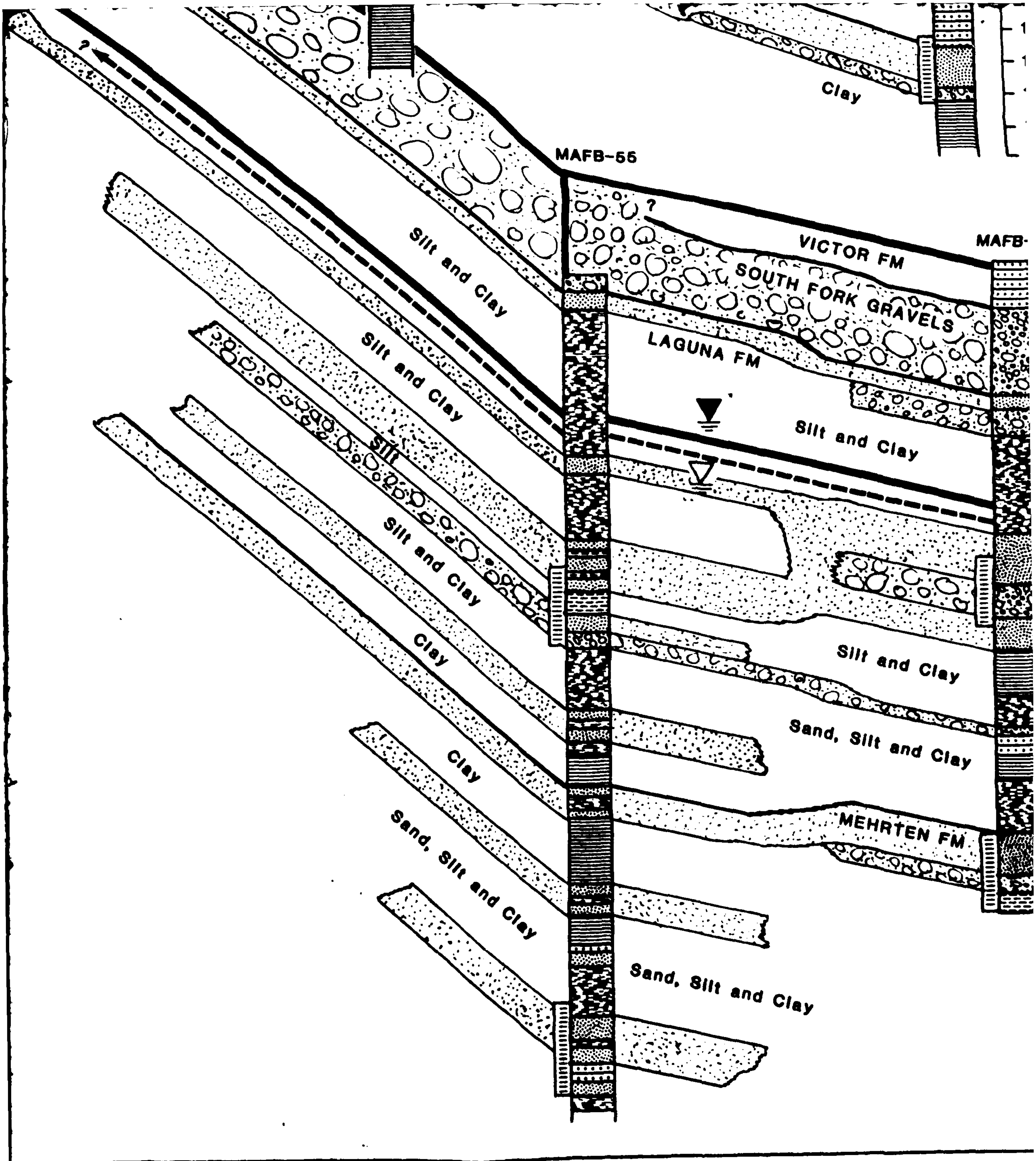

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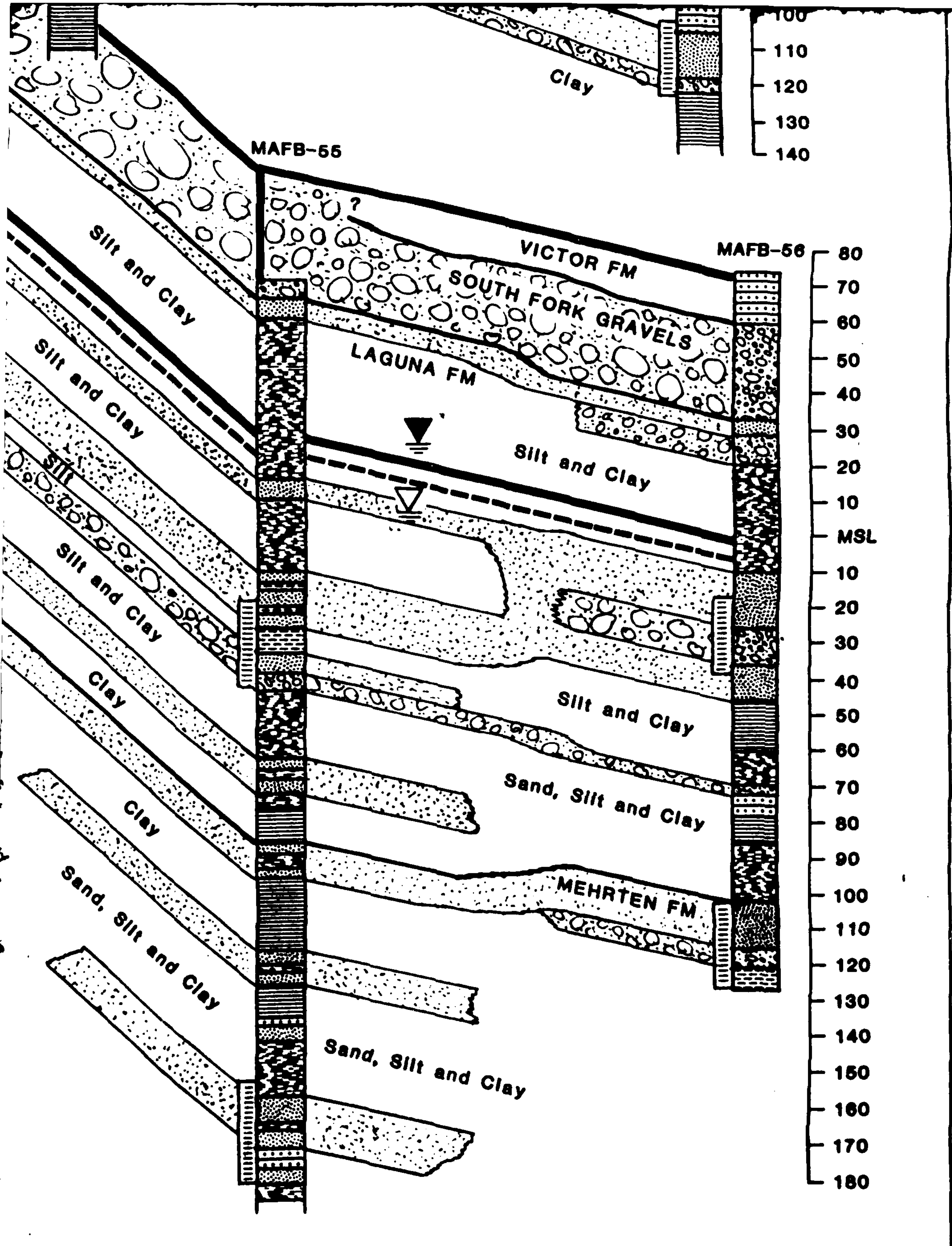
MEHRTEN FM
Sand, Silt and Clay
Sand, Silt and Clay



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LAGUNA FM
Silt and Clay
Silt and Clay
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Sand, Silt and Clay
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MEHRTEN FM
Sand, Silt and Clay
Sand, Silt and Clay

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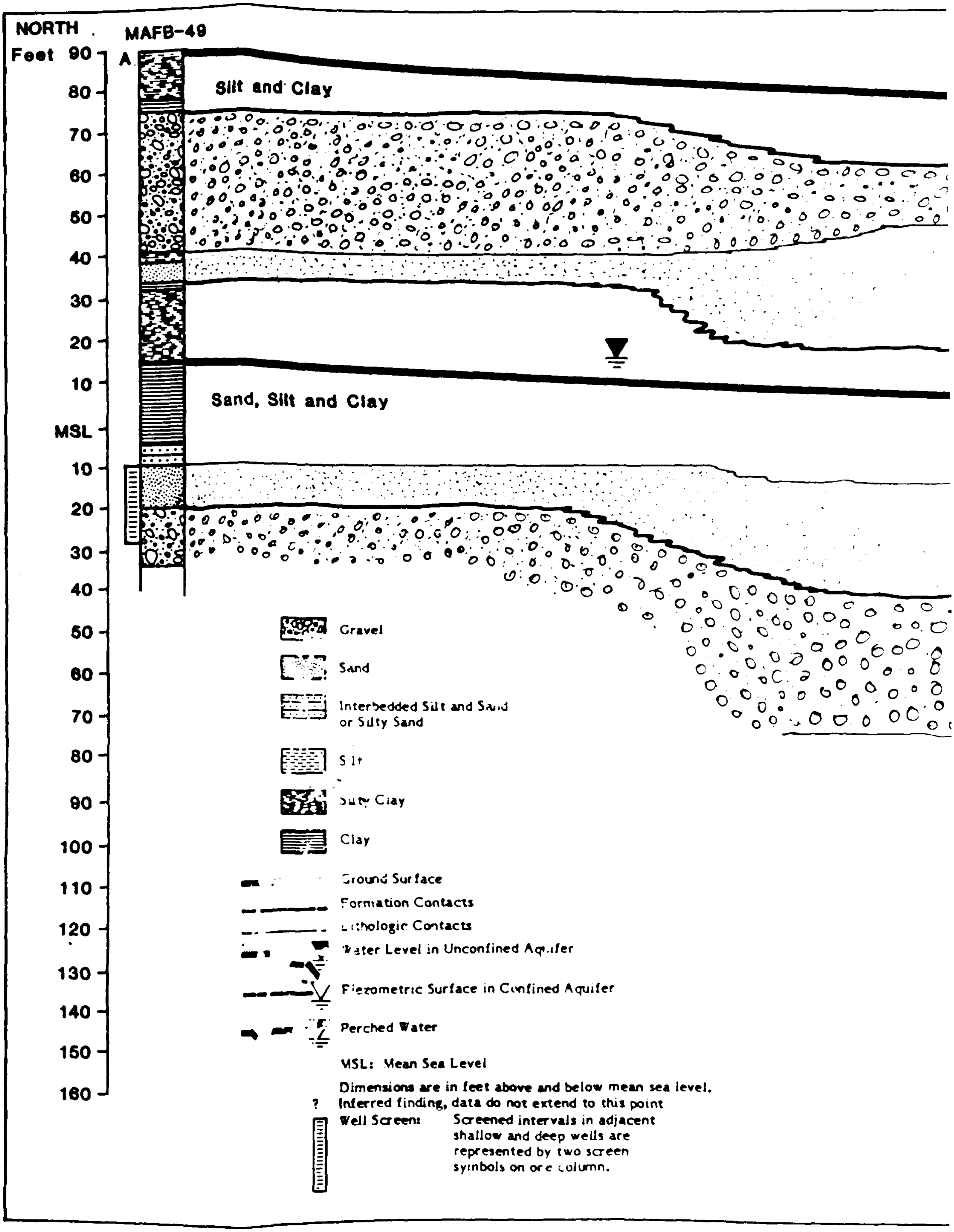

NORTH
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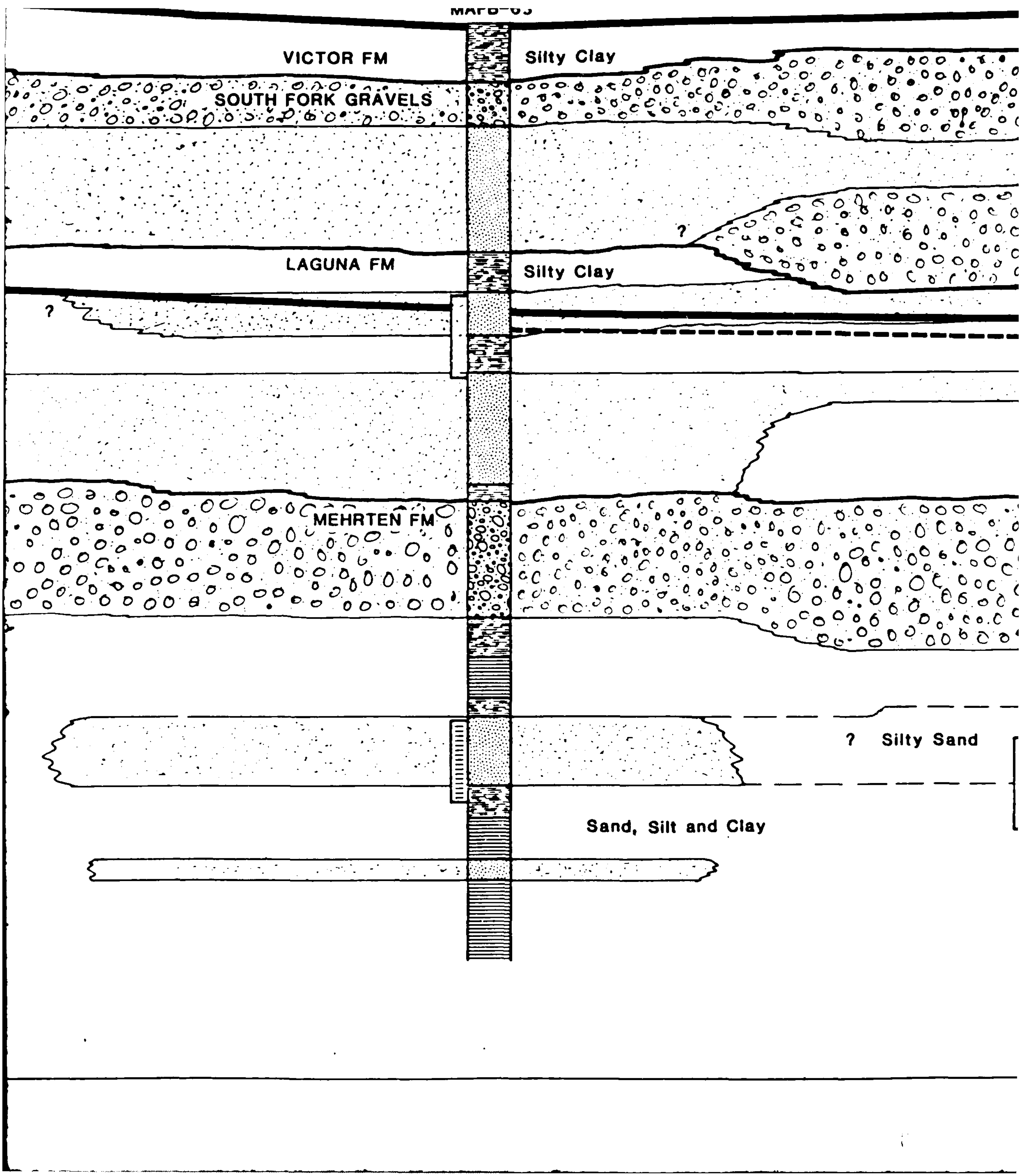
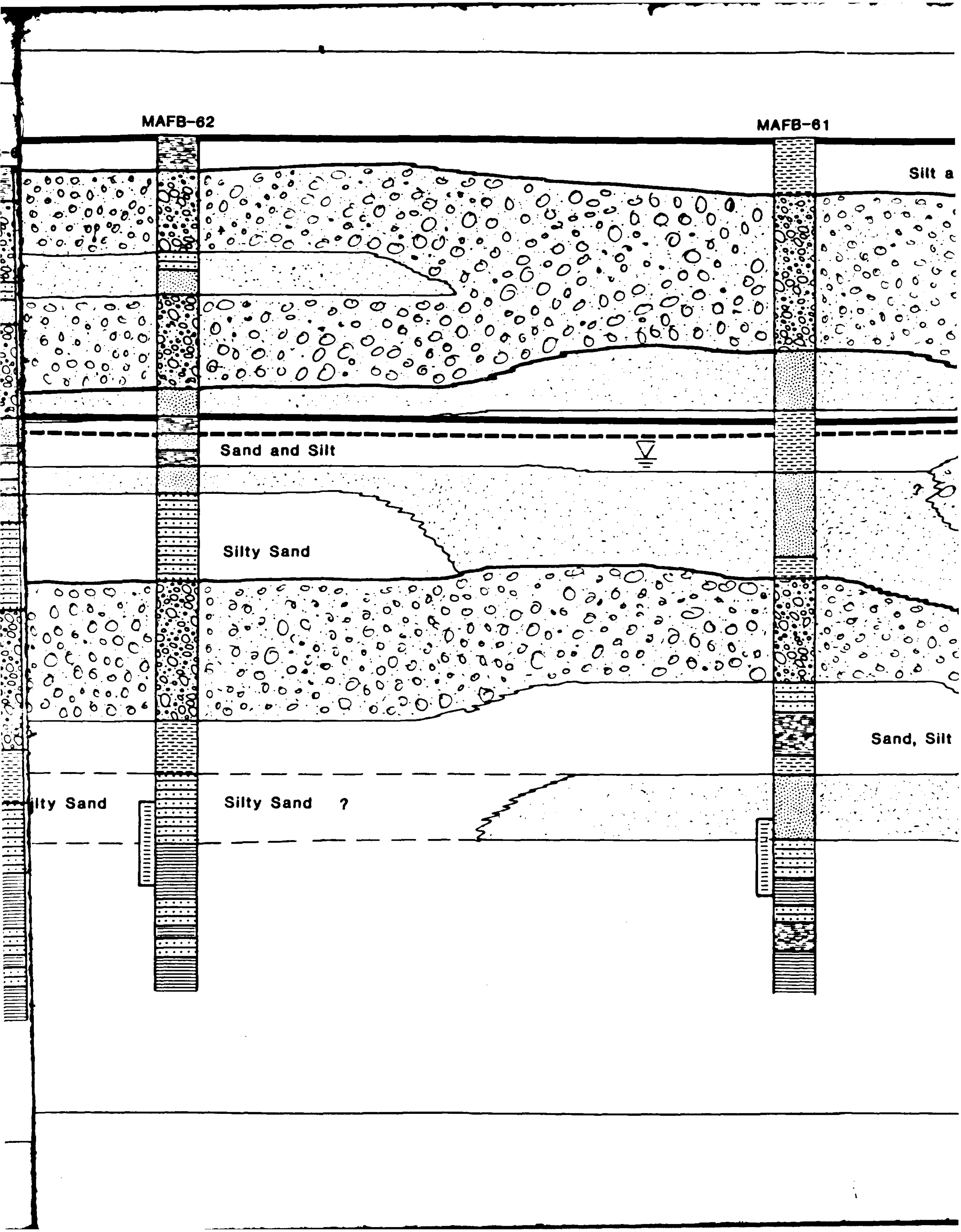
Silt and Clay
Sand, Silt and Clay
Gravel
Sand
Interbedded Silt and Sand or Silty Sand
Silt
Silty Clay
Clay
Ground Surface
Formation Contacts
Lithologic Contacts
Water Level in Unconfined Aquifer
Piezometric Surface in Confined Aquifer
Perched Water
MSL: Mean Sea Level
Dimensions are in feet above and below mean sea level.
? Inferred finding, data do not extend to this point
Well Screen: Screened intervals in adjacent shallow and deep wells are represented by two screen symbols on one column.



MAFB-65
VICTOR FM
Silty Clay
SOUTH FORK GRAVELS
?
LAGUNA FM
Silty Clay
?
MEHRTEN FM
? Silty Sand
Sand, Silt and Clay


MAFB-62
MAFB-61
Silt a
Sand and Silt
Silty Sand
Sand, Silt
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Silty Sand ?

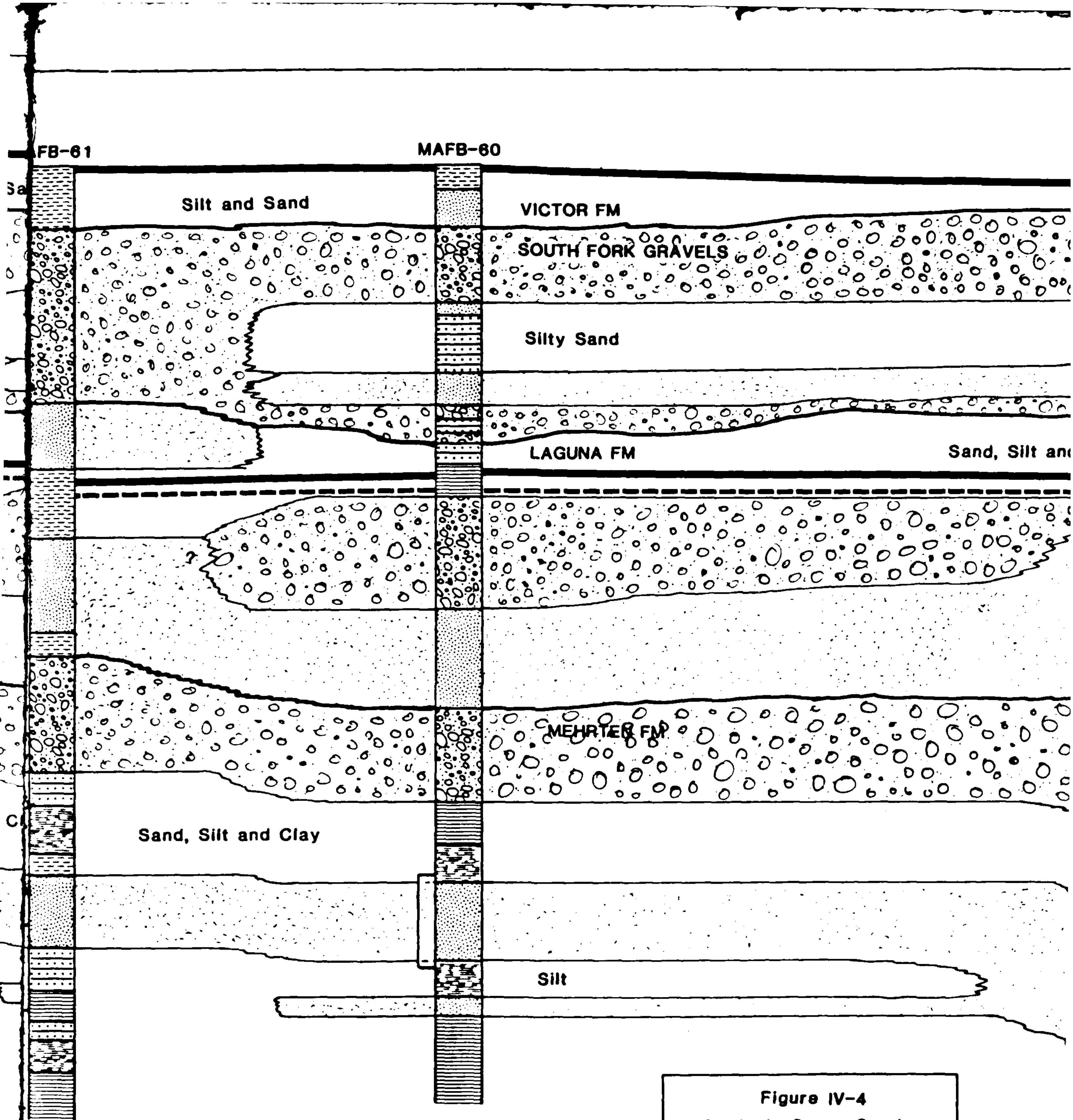


Figure IV-4
Geologic Cross-Section
West Ditch
Mather Air Force Base

AeroVironment Inc.

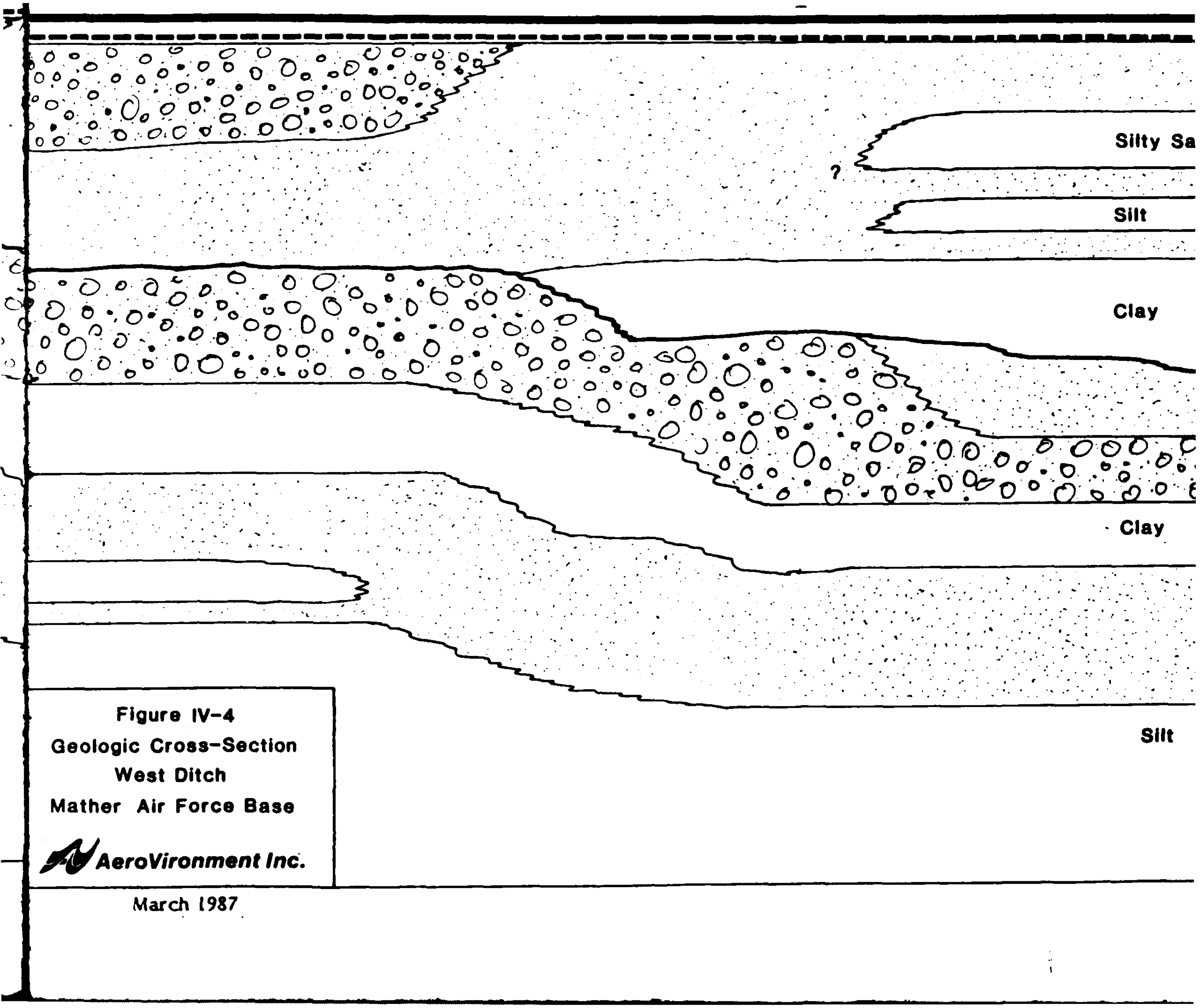
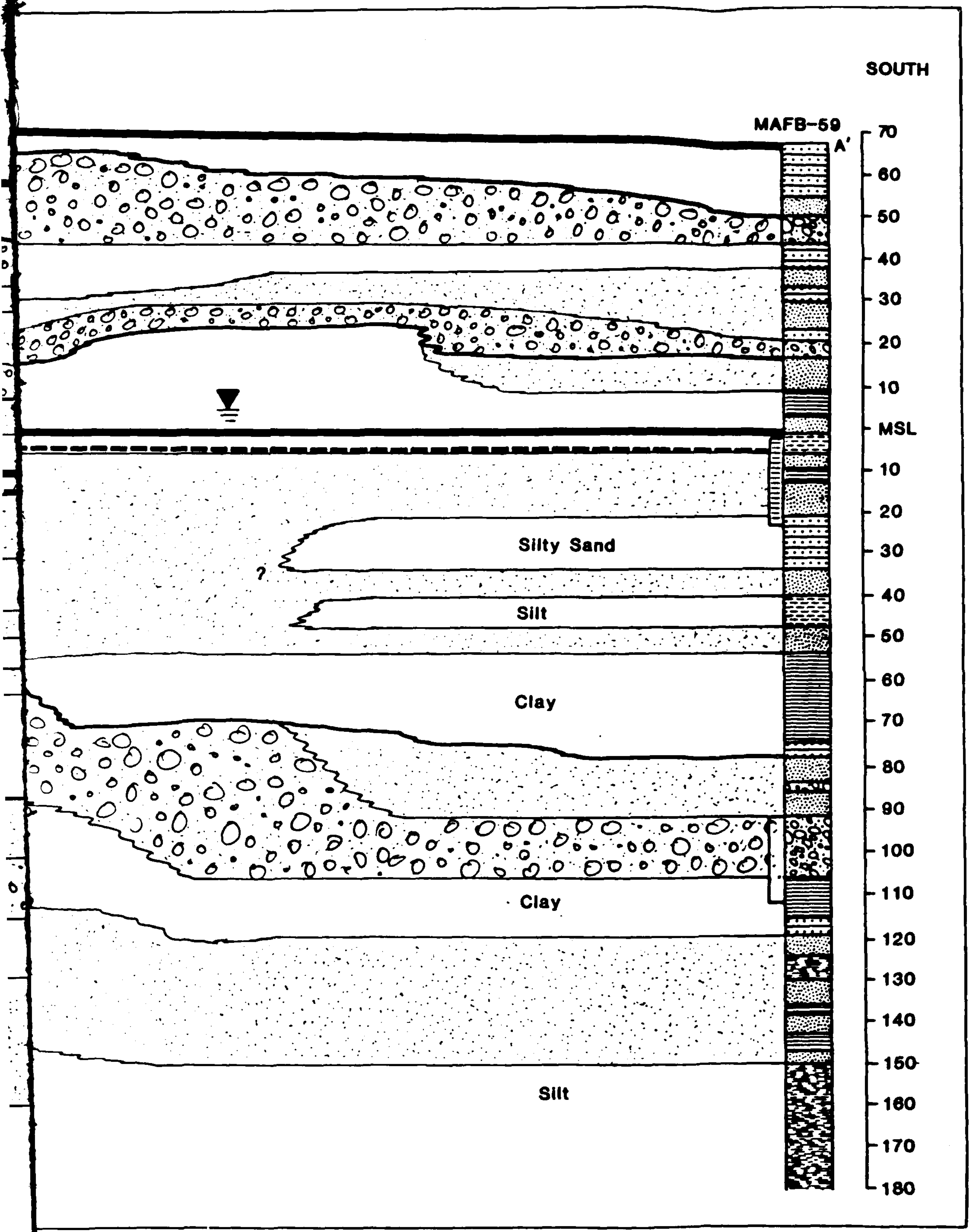


Figure IV-4
Geologic Cross-Section
West Ditch
Mather Air Force Base

AeroVironment Inc.

March 1987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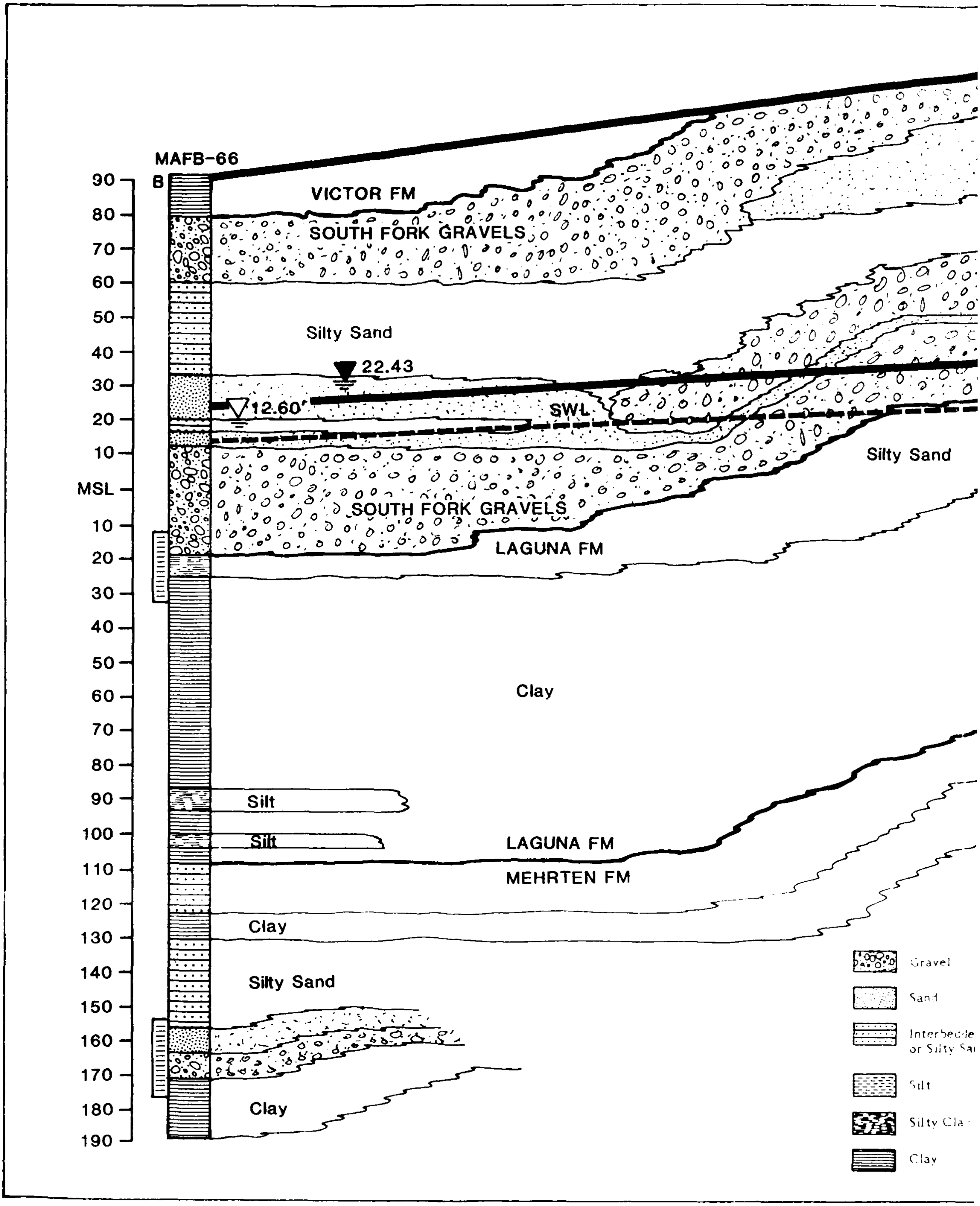

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VICTOR FM
SOUTH FORK GRAVELS
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Silty Sand
SOUTH FORK GRAVELS
LAGUNA FM
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LAGUNA FM
MEHRTEN FM
Clay
Silty Sand
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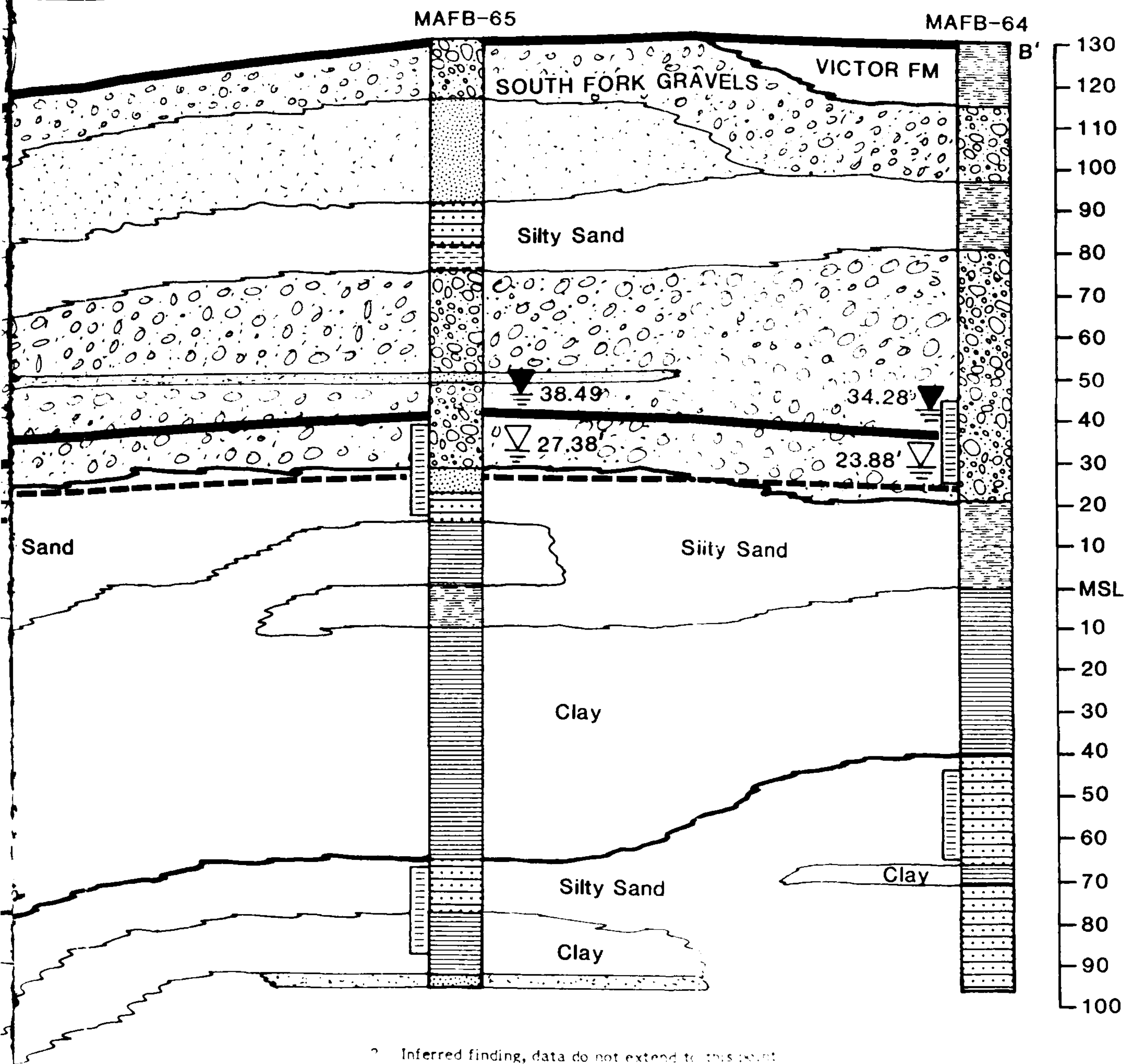
Gravel
Sand
Silt
Clay



? Inferred finding, data do not extend to this point

Surface

Formation Contacts

Lithologic Contacts

Water Level in Unconfined Aquifer

Piezometric Surface in Confined Aquifer

Perched Water

MSL: Mean Sea Level

Dimensions are in feet above and below mean sea level.

Well Screen: Screened intervals in ... shallow and deep wells are represented by two screen symbols on one column.

ravel

Sand

terbedded Silt and Sand or Silty Sand

Silt

Silty Clay

lay

Figure IV-5
Geologic Cross-Section
NE Perimeter
Mather Air Force Base

AeroVironment Inc.

March 1987

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limit percolation of surface water in some areas. Little silt or clay is found in this unit.

In addition, a major set of buried stream channels known as "the superjacent stream channel deposits" run northeast to southwest beneath the base in the northwest corner and through the east-center of the base (CDWR, 1974). Figure II-1 shows these deposits.

The South Fork Gravels lie directly above the Laguna Formation. The Laguna is a heteorogeneous mixture of interbedded clays, clayey sands, and gravels. The matrix material is clay to silty sand with occasional cementation. Gravel occurs in small stringers.

The Mehrten Formation lies beneath the Laguna Formation. It comprises 20-foot thick, vertically-stacked, fining-up cycles. These cycles grade from basal gravel to sand and to fine-grained material (silt and clay) and are found throughout the base. Fining-up cycles are a vertical change in grain size from coarse- to fine-grained (a full definition may be found in Appendix A). The Mehrten Formation has also been found during drilling at industrial property to the northeast (CVRWQCB, 1986). We penetrated only the upper 100 feet during this investigation.

2. Groundwater

During the field program at Mather AFB, AV installed 36 groundwater monitoring wells. Of these, 18 were screened in the first water-bearing zone encountered, and 18 in the first confined aquifer (generally Mehrten Formation) directly below the first water-bearing zone. After all the wells were completed, measuring points were surveyed to an accuracy of $\pm$0.01 feet above mean sea level (MSL) by a California-licensed land surveyor. The lateral location was determined to an accuracy of $\pm$1.0 feet using California state plane coordinates. This information is found in Table O-1 (Appendix O).

Once the measuring points were established, static water levels were measured and a groundwater contour map generated. Water levels were also measured at several wells installed during the Phase II, Stages 1 and 2 IRP efforts, and these were incorporated into our map to provide more complete data on groundwater conditions at the base. Table O-2 shows the static water levels; Figure IV-6 groundwater level information for shallow wells, Figure IV-7 for deep wells.

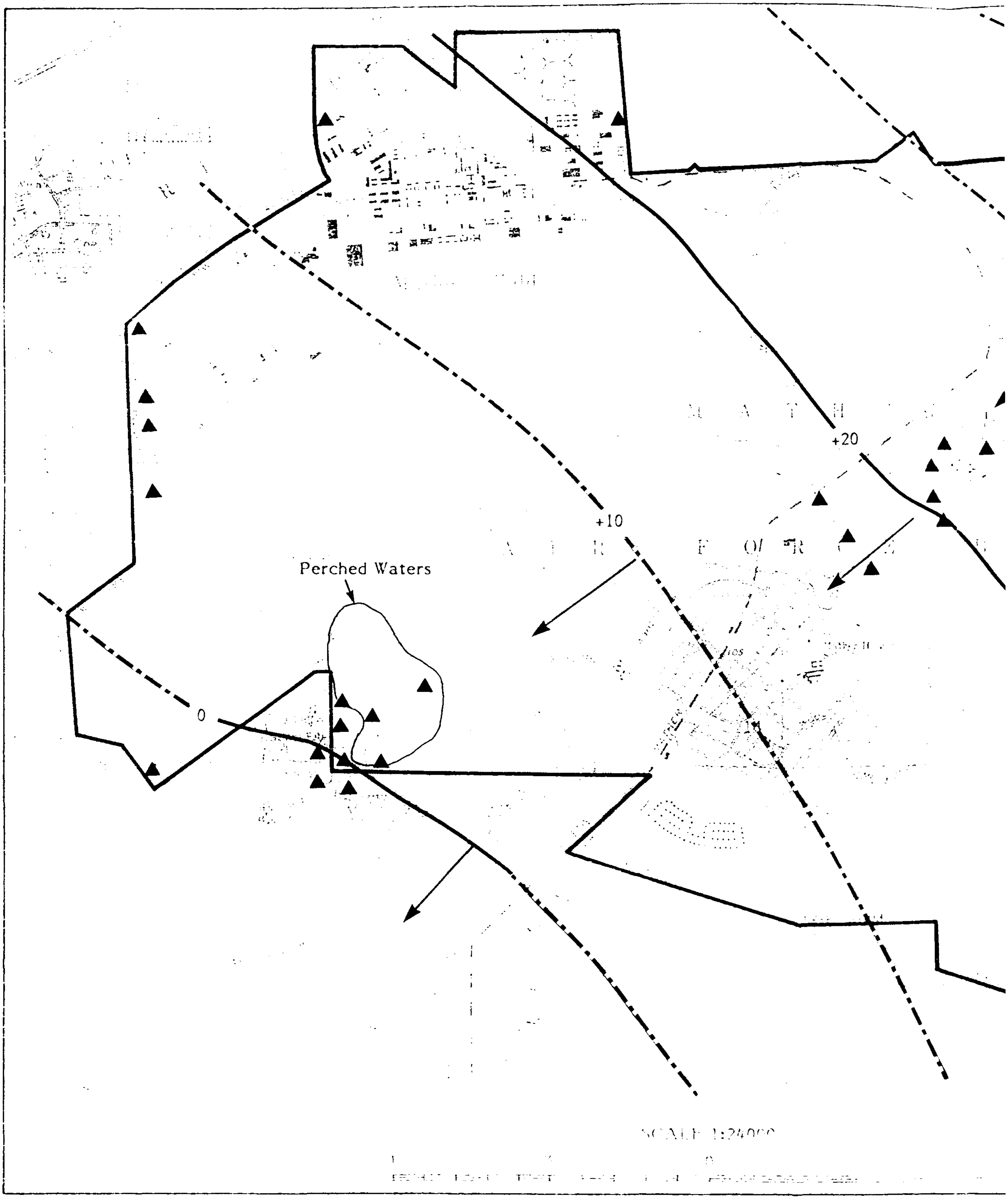
We found that the water table aquifer generally flows from the northeast to the southwest, approximately paralleling the base runways. The elevation of the top of the water table ranges from 35 feet above MSL at the eastern boundary of the base to -3.5 feet MSL in the southwest corner.

An area of perched water was identified at the 7100 Landfill (Site 7). The elevated water table ranges from +7.38 to approximately +30.0 feet MSL and may be due to a mounding effect created by several sewage oxidation ponds containing standing water at this location. Air Force records indicate that these ponds contain water only during periods of high precipitation. Often, we encountered first water under semi-confined conditions. Water levels in these wells (Table O-2) is not water table in the strict sense, but merely a piezometric surface.

The first confined aquifer (Mehrten Formation) flows east-northeast to west-southwest. Groundwater under confined conditions will rise up above the top of the aquifer when a well is installed. The elevation of water in the well is known as its piezometric surface. The piezometric surface ranges from +26.33 feet MSL at the Northeast perimeter of the base to -7.37 feet MSL in the southwest corner.

3. Geophysical Data

Before drilling, geophysical surveys were conducted at two sites. Surveys at the ACW site (Area 12) used magnetometer, pipe-locator and ground-penetrating-radar instrumentation. The 7100 Landfill site (Area 7) investigation used ground conductivity instrumentation. The geophysical survey program was useful in identifying the presence or absence of shallow plumes of contaminated groundwater, and locating buried metallic objects. Site-by-site results, including figures showing the geophysical anomalies mapped, are given in Appendix J.


Perched Waters
0
+10
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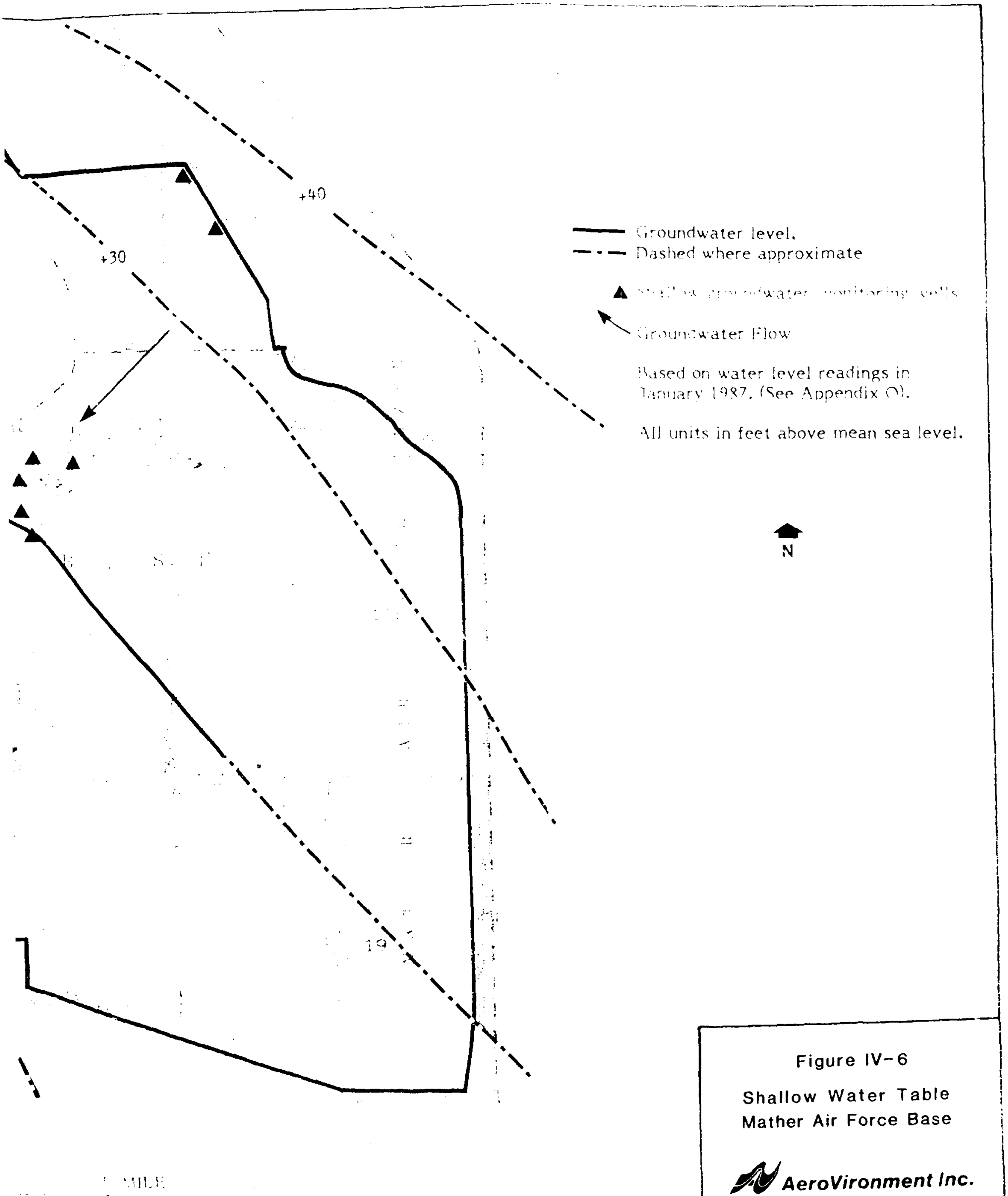

Figure IV-6
Shallow Water Table
Mather Air Force Base

AeroVironment Inc.

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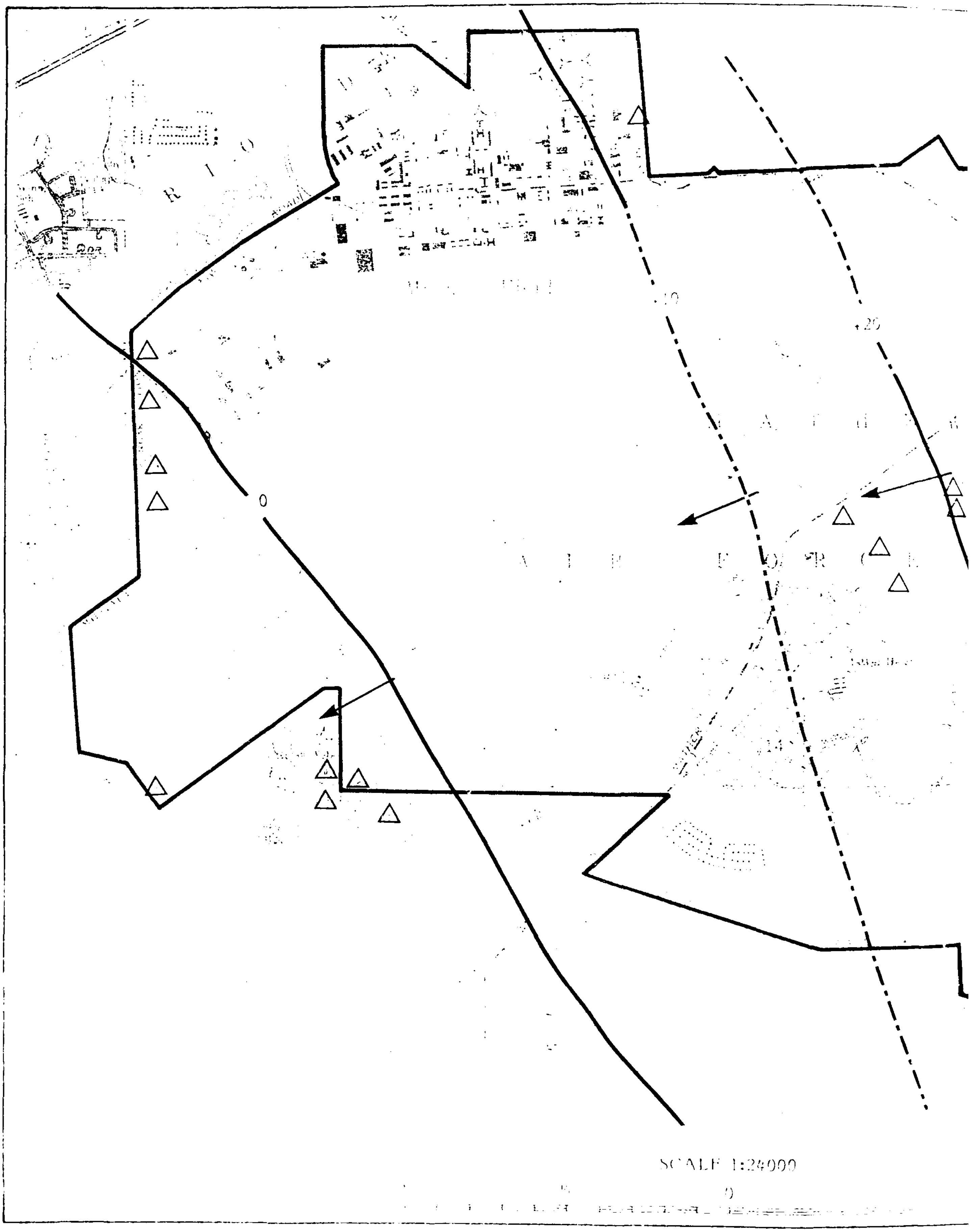

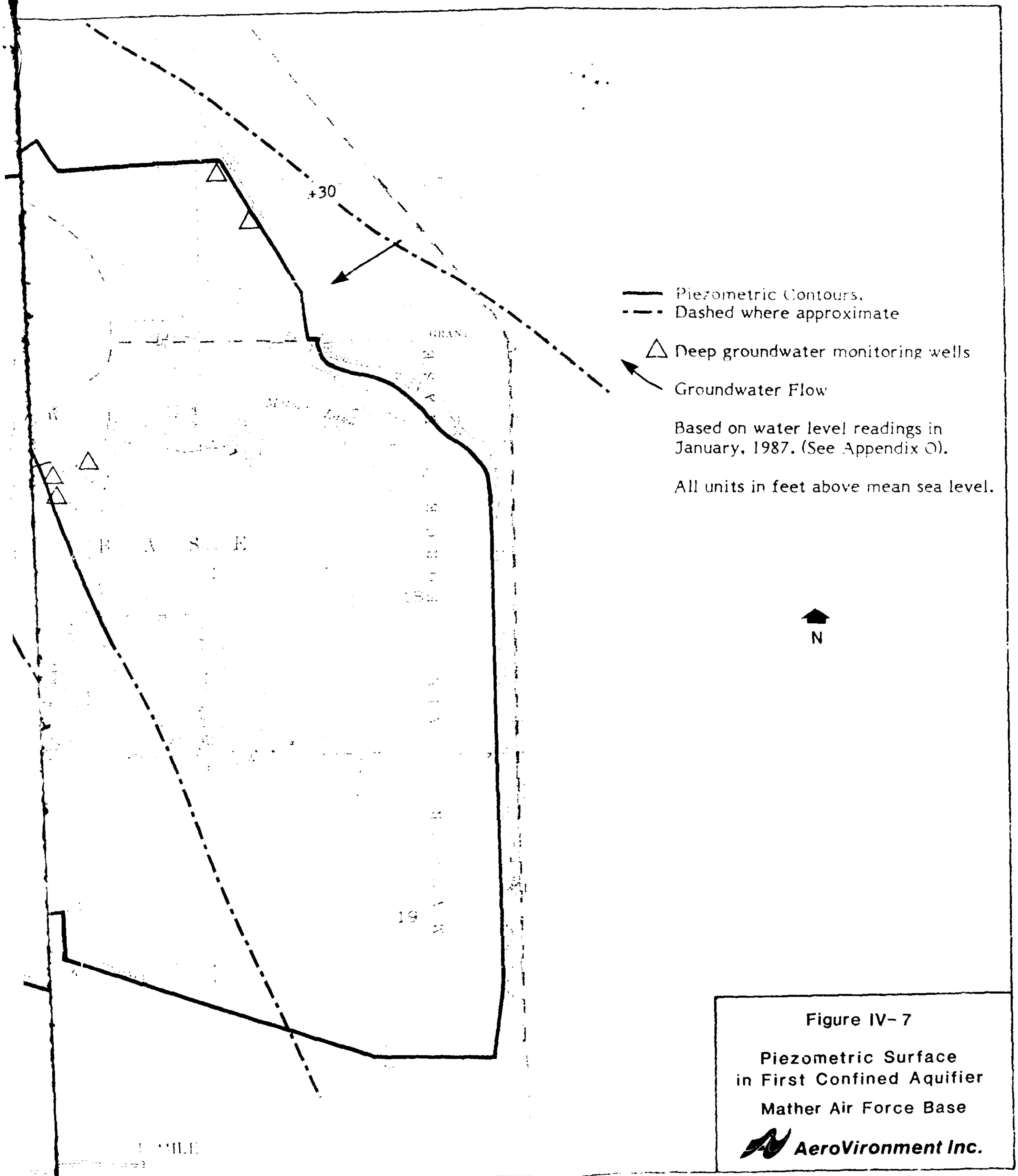

Figure IV-7

Piezometric Surface in First Confined Aquifier

Mather Air Force Base

AeroVironment Inc.

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Results of the geophysical surveys pertinent to locating the monitoring wells are briefly described below.

Area 7 -- 7100 Disposal Area

The western portion of the 7100 Landfill investigation area is downgradient from the actual landfill and displays the highest conductivity, possibly due to solution migration. Monitoring wells were relocated to intercept the groundwater migrating through the areas of highest conductivity.

Area 12 -- ACW Disposal Site

The surface and subsurface of the ACW Disposal Site contain about 12 metal objects as determined by ground-penetrating radar. The pipe locator was used in an attempt to pinpoint several of these objects. A significant pipe locator response was expected if the disposal pipe was within two or three feet of the surface. No such corroborative responses were seen in the study area, probably indicating that the pipe has been removed. For this reason, we did not change the well locations and we eliminated the near-surface excavations from the Stage III work schedule.

4. Soil Gas Survey

At the ACW area a soil gas survey was made to delineate the distribution of TCE first identified in the Phase II, Stage I study in the subsurface underlying the site. The results of the survey were to be used in the placement of monitoring wells. Portions of the borrow pit just off base at the 7100 Landfill were also surveyed because empty 55-gallon steel drums were found in one area of the pit.

A total of 59 soil gas samples were taken. Analytical results are summarized in Appendix Q, which also contains maps of the sampling locations.

The low values for TCE indicate that there is no significant shallow soil contamination at the two sites investigated and thus that the source of the groundwater contamination is not from the shallow soil. For this reason, we

determined the monitoring well locations solely on groundwater flow direction and the suspected location of the ACW disposal pipe as determined by interviews with base personnel.

It is very unusual that soil gas analyses were unable to detect the contamination source. Normally, concentrations greater than 10 µg/L are detectable for many years at source areas large enough to be responsible for groundwater contamination. It is possible that the "disposal pipe" at the ACW site, introduced the contaminant below an impermeable layer, which would account for the lack of detectable soil contamination. It is also possible that the odors in the borrow pit near the 7100 Area were caused by inorganic compounds that could not be detected by the equipment. No soil samples were taken because no contamination was found by the soil gas.

5. Water Sampling Results

Groundwater samples were collected in two rounds from the 35 wells installed during Phase II, Stage 3, from 1 well installed as part of Phase II, Stage 2, and from 8 of the 11 Stage 1 wells. In addition, during the second round, samples were collected from 10 of the 15 base production wells. The first round of samples were collected in November 1986, the second round in December 1986. Tables N-1 through N-54 (Appendix N) show the laboratory results. Table N-55 gives the detection limits for analytical work.

The two sets of analyses for each well provide an opportunity to check that the results are reproducible. Because the samples were taken about 30 days apart, no time-induced changes were likely. In general, the analytical results from the two sampling rounds agree very well. Quality assurance data are presented as part of the laboratory reports in Appendix G; quality assurance/quality control results for the water samples are discussed in detail in Section III.E.

Tables N-1 through N-54 show the first and second round results for each well side by side for easy review (except for production wells, which were sampled only once). The heading for each column shows the sampling round, the sampling date and the sample number used by both AV and Acurex (the laboratory) to track and report the sample results. This sample number corresponds to the sample number shown on the laboratory reports in Appendix G. The tables also

show the results, surrogate recovery (where appropriate) and analysis date for each parameter tested.

All gas chromatographic sample analyses (601, 8020), which had detectable levels of the method analytes were confirmed using second-column GC. The secondary columns used are listed in the analytical reports contained in Appendix G. All second-column confirmations were run within the holding times specified under the methods.

For this investigation, the criteria for establishing the significance of analytical findings took into account the following factors:

- Laboratory or field-induced background contamination, identified using laboratory and field blank samples.

- The limit of quantification (LOQ) for the analyte of interest, which is typically calculated as five to ten times the method's detection limit. The detection limit for each method was calculated by the laboratory as three times the standard deviation of the "noise."

- The reproducibility of the measurements, both within sampling rounds and between rounds.

- The DOHS action levels and EPA Maximum Contaminant Limits (MCLs) for applicable parameters (DOHS, 1986). Parameters for which action levels are not specified are assessed using other accepted water quality standards and available toxicity data (EPA, 1976; DOHS, 1978 & 1984).

In determining whether a finding is significant, after the data have been reviewed for validity (laboratory and field quality assurance/quality control evaluation), the first step is to determine whether a DOHS action level has been established for the parameter. Table IV-1 shows the current DOHS action levels. In some cases, the action level is below the LOQ for a given parameter.

TABLE IV-1. Applicable Action Levels Recommended by the California Department of Health Services, December 1986

Chemical	Action Level+ parts per billion (ppb)
Purgeable Halocarbons	
Carbon Tetrachloride	5.00 [5.00]
1,2-Dichloroethane	1.00 [5.00]
Tetrachloroethylene	4.00
Trichloroethylene	5.00 [5.00]
Vinyl Chloride	2.00 [2.00]
Purgeable Aromatics	
Benzene	0.70 [5.00]
1,2-Dichlorobenzene	130.00 (10)*
1,4-Dichlorobenzene	Limit of Quantification (0.5)
Ethylbenzene	680.00 (29)*
Toluene	100.00

(Action Level for dichlorobenzene is either for a single isomer or for the sum of the 3 isomers)

*Taste and Odor Threshold

+Action levels were used for these compounds because they meet or exceed the maximum contaminant levels (MCLs) established by the EPA. The MCLs, when established, are included in brackets [ ].

For these, the detected concentration must be considered significant, assuming all necessary QA/QC objectives have been met. Results that were not repeatable between rounds but that exceeded DOHS action level for one sampling round must also be considered significant, though inconclusive.

Almost all of the groundwater samples (including the field blank) showed small amounts of methylene chloride. We consider this to be laboratory-induced contamination. Table IV-2 summarizes the results of field blank analyses. The chemicals found in the samples were compared to those found in the blanks. If a chemical in a sample had a concentration at or lower than the concentration found in the blank, we consider it to be either laboratory- or field-induced error. Some compounds were reported at low concentrations on some samples, but were below the LOQ and usually not repeatable. Results that are not above the LOQ of the method (typically 5-10 times detection limits) are not precise and are not considered significant. Results that were not repeatable, i.e., that did not occur in both sampling rounds, are not considered significant unless a DOHS action level is exceeded.

A total of 26 "significant" results were identified in the volatile organics data package for Mather. Table IV-3 shows these. They are also shown as the fraction of the result divided by the California Department of Health Services (DOHS) action level. Of the 26 significant findings, 22, which we derived from 12 monitoring wells and one production well (Housing Well 1), were over the action levels. Trichloroethene (TCE) was found in 10 wells, tetrachloroethene (PCE) in 4, benzene and five other aromatic volatiles in 7, vinyl chloride in 2, and 1,2-dichloroethane in one. Some of the Base Production wells in the housing area generally exceed EPA MCLs for manganese and lead during the bases regular quality checks.

Shallow wells MAFB-1,2,3 and 52 downgradient from the ACW area exceeded the state action level for TCE with concentrations of 790, 35, 130 and 5.7 µg/L, respectively. In addition, deep well MAFB-70 contained 22 µg/L benzene (over the state action limit) and 1.6 µg/L 1,4-dichlorobenzene. Deep well MAFB-71 contained 23 µg/L xylene.

TABLE IV-2. Summary of Field Blank Contamination

Chemical	Maximum Concentration Found in Blank
Methylene Chloride	9.9 μg/L
Chloroform	4.8 μg/L
1,1,1-Trichloroethane	2.5 μg/L
Phenols	.03 μg/L
Barium	.02 mg/L
Chromium	.023 mg/L

TABLE IV-3. Summary of Significant Results

Site No.	Site Name	Well No.	Compound	Results (µg/L)
7	7100	07	None	--
7	7100	08	Vinyl Chloride	0.7/2.0*
			TCE	2.6/11*
			Benzene	1.0/1.5*
7	7100	09	TCE	0.9/3.8
7	7100	40	Benzene	ND/1.1*
7	7100	41	Vinyl chloride	9.9/1.0*
			1,2-Dichloroethane	2.5/ND*
			TCE	22/7.0*
			PCE	2.7/0.6
			1,4-Dichlorobenzene	3.3/ND*
7	7100	42	TCE	13/17*
			PCE	3.6/2.7
7	7100	43,45	None	--
7	7100	46	Benzene	0.9/ND*
7	7100	55,58	None	--
12	ACW	01	TCE	770/790*
12	ACW	02	TCE	23/25*
12	ACW	03	TCE	90/130*
12	ACW	50,51	None	--
12	ACW	52	TCE	4.1/5.7*
12	ACW	53,54	None	--
12	ACW	67,69	None	--
12	ACW	70	Benzene	ND/22*
			1,4-Dichlorobenzene	ND/1.6*
12	ACW	71	Xylene	23/9.0
12	ACW	72	None	--
15	West Ditch	10,11	None	--
15	West Ditch	47	TCE	7.6/36*
			PCE	2.5/7.7*
15	West Ditch	48,49	None	--
15	West Ditch	59,62	None	--
15	West Ditch	63	TCE	6.3/1.8*
			PCE	12/11*
			Benzene	ND/0.9*
	NE Perimeter	64,66, 73,75,76	None	--
	Production	HW-01	1,2-dichloroethane	2.8*

*At least one sampling round result exceeds the DOHS Action Level for the compound. Refer to Table IV-1 for action levels.

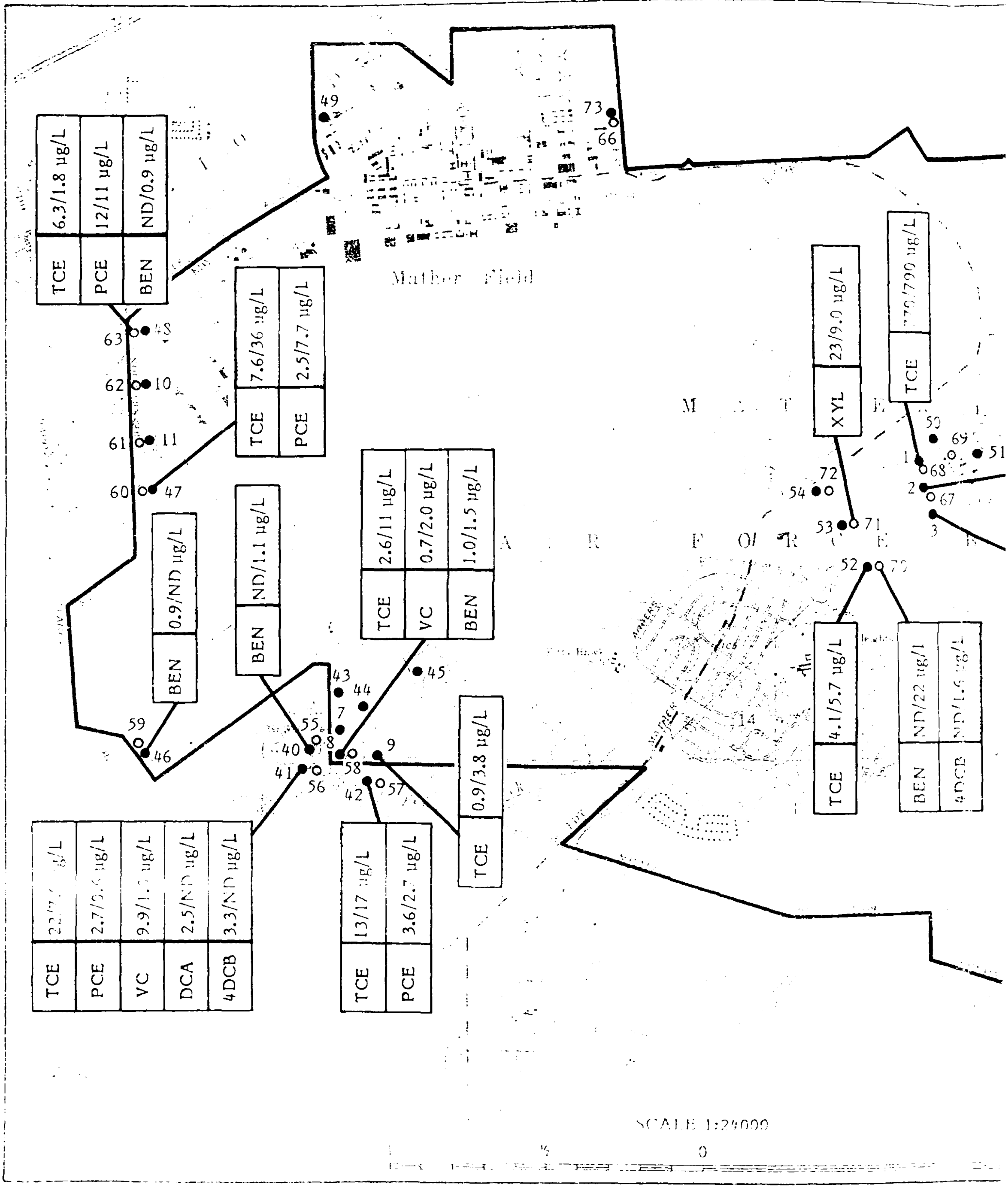
Shallow well MAFB-47 at the West Ditch contained concentrations of TCE (up to 64 µg/L and 18 µg/L, respectively, in the second round duplicate sample from this well) above the state action level. Deep well MAFB-63 at the same site contained 6.3 µg/L TCE, 12 µg/L PCE and 0.9 µg/L benzene, all above the action level.

Five shallow wells downgradient from the 7100 Area were found to contain significant levels of contaminants. MAFB-42 contained 17 µg/L TCE and 3.6 µg/L PCE. MAFB-8 contained 11 µg/L TCE, 2.1 ug/L vinyl chloride and 1.5 µg/L benzene. MAFB-40 contained 1.1 µg/L benzene while MAFB-9 contained 3.8 TCE. Finally, MAFB-41 contained 22 µg/L TCE, 2.7 µg/L PCE, 9.9 µg/L vinyl chloride, 2.8 µg/L 1,2-Dichloroethane and 3.3 µg/L 1,4-Dichlorobenzene. In addition, shallow well MAFB-46, located near the Jet test cell, exceeded the benzene standard with 0.9 µg/L.

Base production well HW-01 was sampled only once and found to contain 2.8 µg/L 1,2-Dichloroethane, which is above the state action level. However, a split sample collected and analyzed by the base BEE showed no evidence of 1,2-Dichloroethane. In 13 other sampling events conducted since January, 1985, this contaminant has never again been detected in this well.

Figure IV-8 shows the significant results from Phase II, Stage 3 sampling. In general, deep wells throughout the base are free of contamination, except for benzene and related compounds found at very low concentrations. The compounds found in the deep wells would normally be considered insignificant because they were found in low concentrations and were not repeatable. However, because of the very low action levels set for benzene and 1,4-Dichlorobenzene, they are listed as significant. Even so, the benzene, dichlorobenzene, ethylbenzene, toluene and xylene found in deep wells is suspect (probably field or laboratory contamination). Only one deep well, No. 63 (West Ditch), showed repeatable significant contamination (TCE and PCE).

The background wells at the ACW and the 7100 area, in addition to upgradient wells along the base's northeast perimeter, showed no evidence of chemical contamination. Thus, the chemicals found in downgradient wells appear to be coming from the sites. None of the chemicals found in shallow wells sampled



Mather Field
TCE 6.3/1.8 µg/L
PCE 12/11 µg/L
BEN ND/0.9 µg/L
TCE 7.6/36 µg/L
PCE 2.5/7.7 µg/L
BEN 0.9/ND µg/L
BEN ND/1.1 µg/L
TCE 2.6/11 µg/L
VC 0.7/2.0 µg/L
BEN 1.0/1.5 µg/L
TCE 0.9/3.8 µg/L
PCE 2.7/9.4 µg/L
VC 9.9/1.3 µg/L
DCA 2.5/ND µg/L
4DCB 3.3/ND µg/L
TCE 13/17 µg/L
PCE 3.6/2.7 µg/L
XYL 23/9.0 µg/L
TCE 770/790 µg/L
TCE 4.1/5.7 µg/L
BEN ND/22 µg/L
4DCB ND/1.4 µg/L
49
73
66
48
63
62
10
61
11
60
47
59
46
43
44
45
7
55
8
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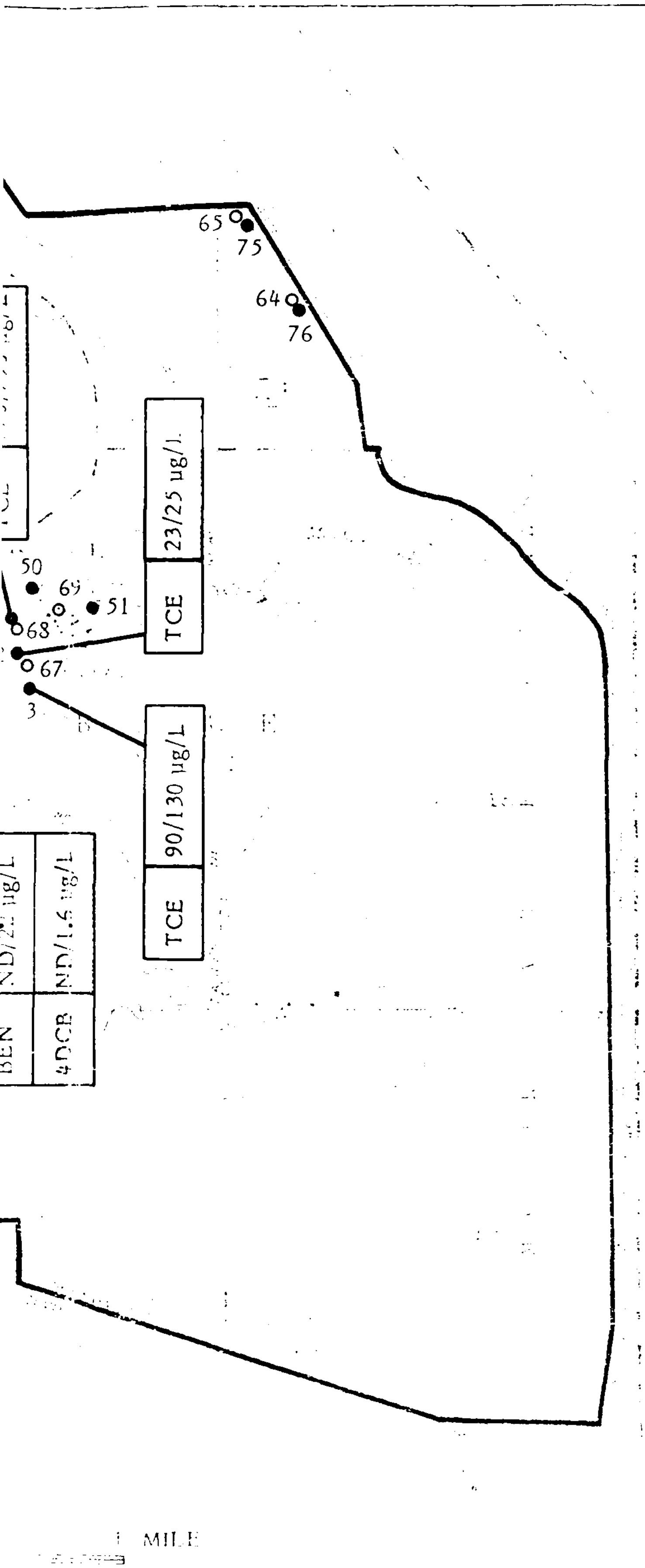

Samples collected in November and December as part of IRP Phase II, Stage 3.

● Shallow wells
○ Deep wells

TCE: Trichloroethene (5)

PCE: Tetrachlorethene (4)

BEN: Benzene (0.7)

VC: Vinyl Chloride (2)

DCA: 1,2-Dichloroethane (1)

4DCB: 1,4-Dichlorobenzene (130)

XYL: Xylene (620)

( ) California Department of Health Services Action Levels in PPB

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Figure IV-8
Groundwater Chemistry Results
Mather Air Force Base

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in Stage 3 are surprising, based on historical operating procedures and prior sampling. However, the contamination found in base production well HW-01 was not expected. Since split samples collected by Mather's Bioenvironmental Engineer showed no detectable concentration of this contaminant, this result is also suspect.

A review of the inorganics data package found no significant contamination mentioned above. All metal concentrations were below drinking water standards and anions and cations were found at background concentrations. The specific criteria used to evaluate the inorganics results are shown on Table IV-4.

Of particular interest in the inorganics data package are the anion and cation data. Figures IV-9 through IV-13 show trilinear diagrams for the water samples collected from each of the Stage 3 sites plus base production wells. A trilinear diagram is a plot of the major individual cations and anions found in a water sample, as a percent of the total cations and anions (based on milliequivalents). The points on the cation grid and anion grid are then connected on the upper grid, which indicates the predominant chemical constituents of the water (Davis, 1966). Each point in the grid represents one well. The trilinear plots offer a graphical representation of this inorganic chemistry of a specific well relative to that of other wells. Since overlying aquifers typically have characteristically different anion/cation balances, they will produce distinctly different points on the trilinear plots. Water from shallow wells are plotted as asterisks and water from deep wells as triangles. Anion and cation data are presented at the end of Appendix G. The plots show that the water from shallow wells at all sites has a similar geochemistry, primarily calcium-magnesium-bicarbonate. Deep wells were found to yield somewhat different water, being primarily sodium-potassium-bicarbonate. This indicates that there is probably no significant communication between the water in the two aquifers.

No petroleum hydrocarbons, phenols or cyanide were found in water samples from the 7100 Area, which was tested for these parameters.

TABLE IV-4. Summary of Inorganic Water Quality Objectives

Compound/Element	Primary Drinking Water Standard[1]* (MCLs)
Chloride	250 mg/L (secondary standard)
Sulfate	500 mg/L (secondary standard)
Nitrate	10 mg/L
Bromide	NA
Floride	1.4-2.4 mg/L
Nitrite	NA
Phosphate	NA
Alkalinity	>20 mg/L (EPA's Quality Criteria for Water)
Calcium	NA
Magnesium	NA
Iron	300 μg/L (secondary standard)
Manganese	50 μg/L (secondary standard)
Sodium	NA
TDS	500 mg/L (secondary standard)
Hardness	NA
Arsenic	50 μg/L
Barium	1 mg/L
Cadmium	10 μg/L
Chromium	50 μg/L
Lead	50 μg/L
Mercury	2 μg/L
Selenium	10 μg/L
Silver	50 μg/L
Cyanide	200 μg/L

(1)Unless otherwise stated
*(EPA, 1976; DOHS, 1978; DOHS, 1984).

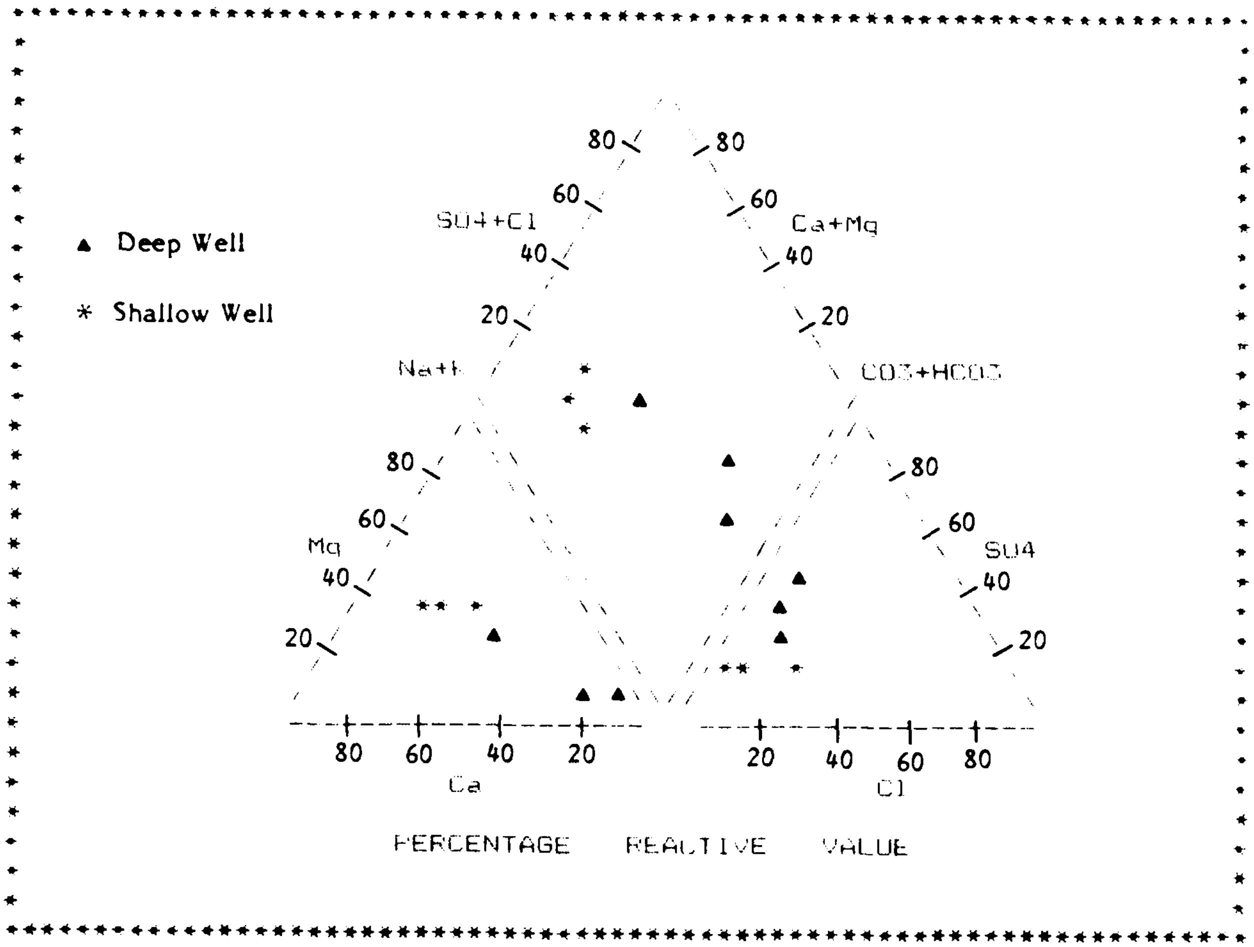

FIGURE IV-9. Groundwater anion/cation balance, Northeast Perimeter Wells

87-371

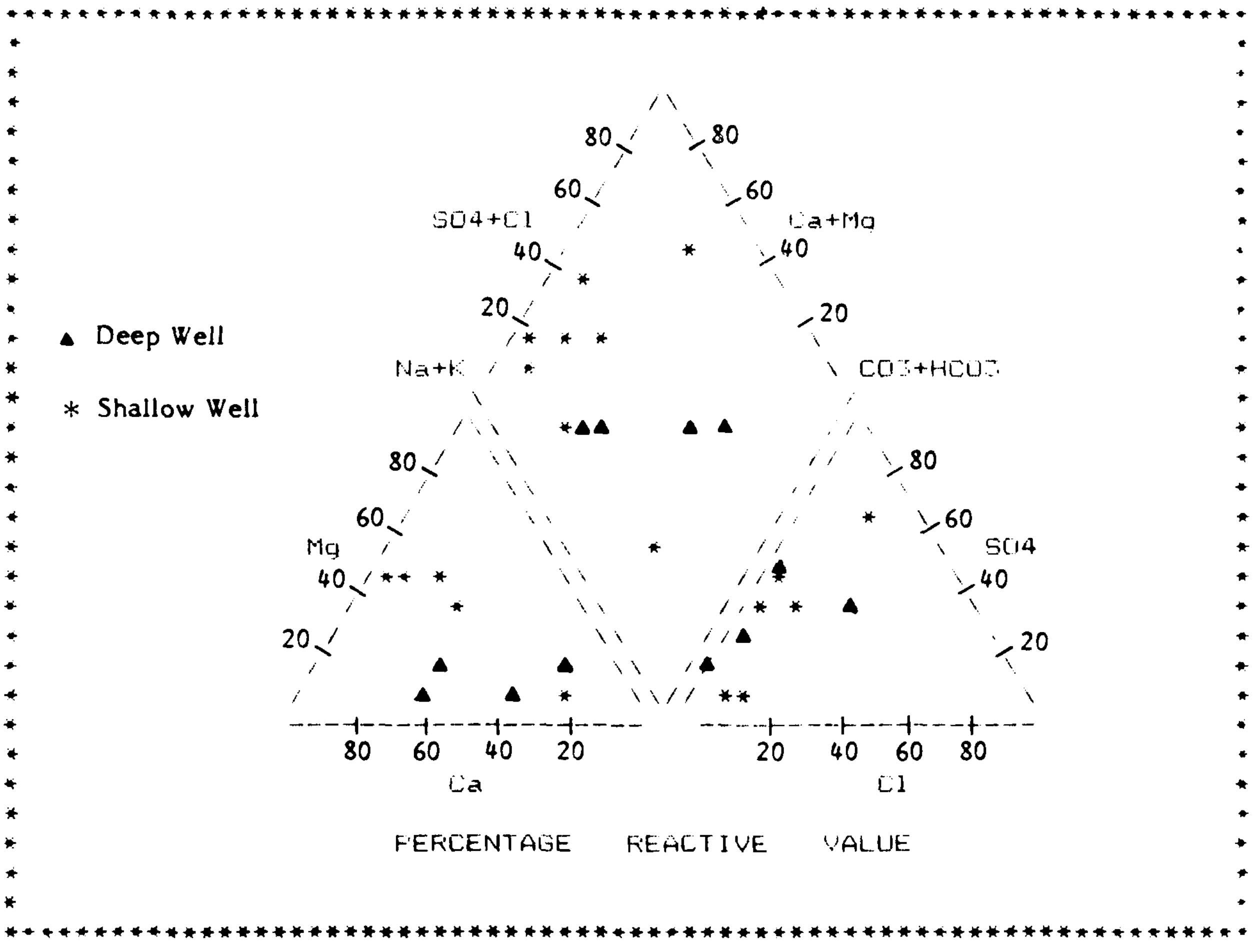

FIGURE IV-10. Groundwater anion/cation balance, 7100 Disposal Area Wells

87-372

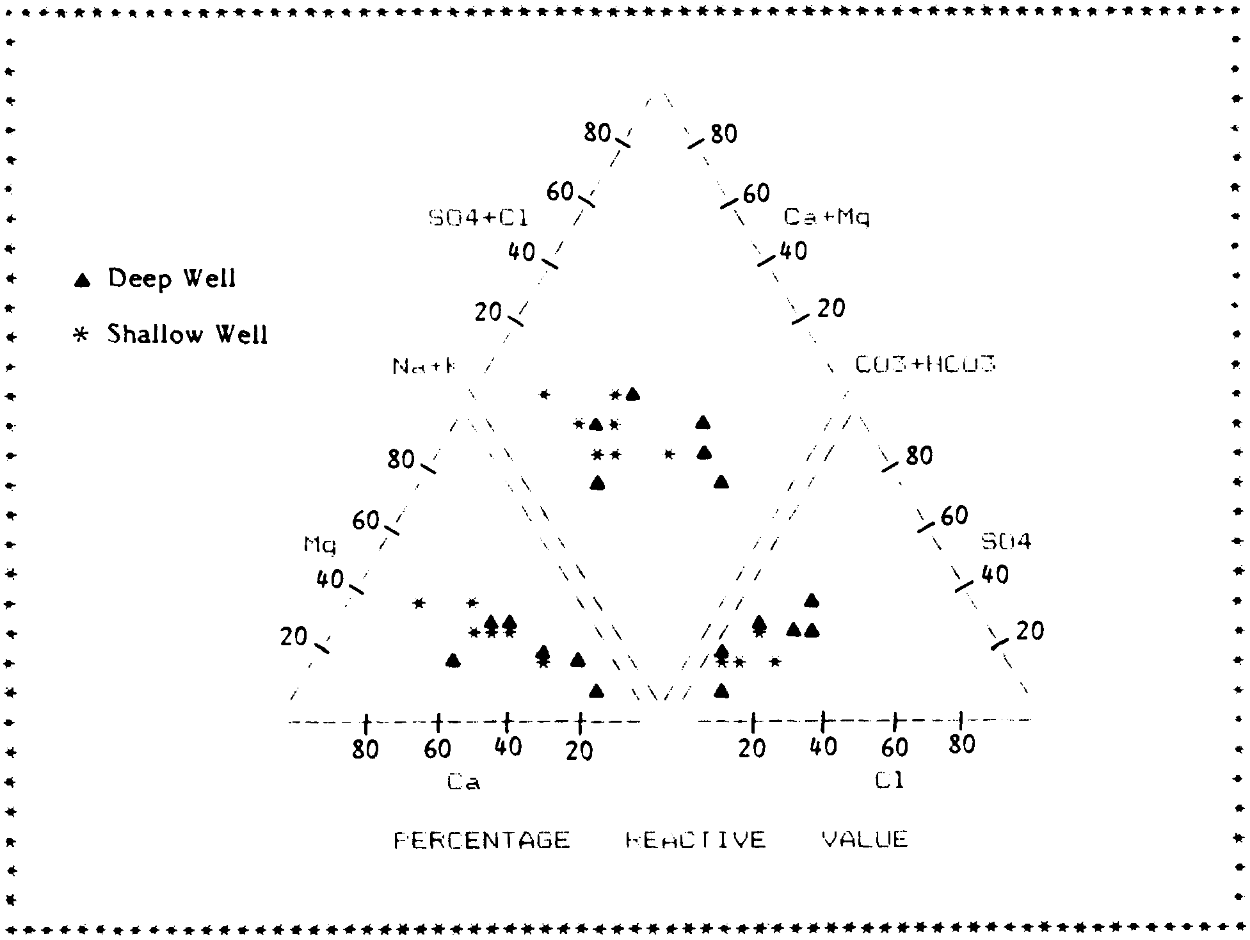

FIGURE IV-11. Groundwater anion/cation balance, ACW Disposal Site Wells

87-373

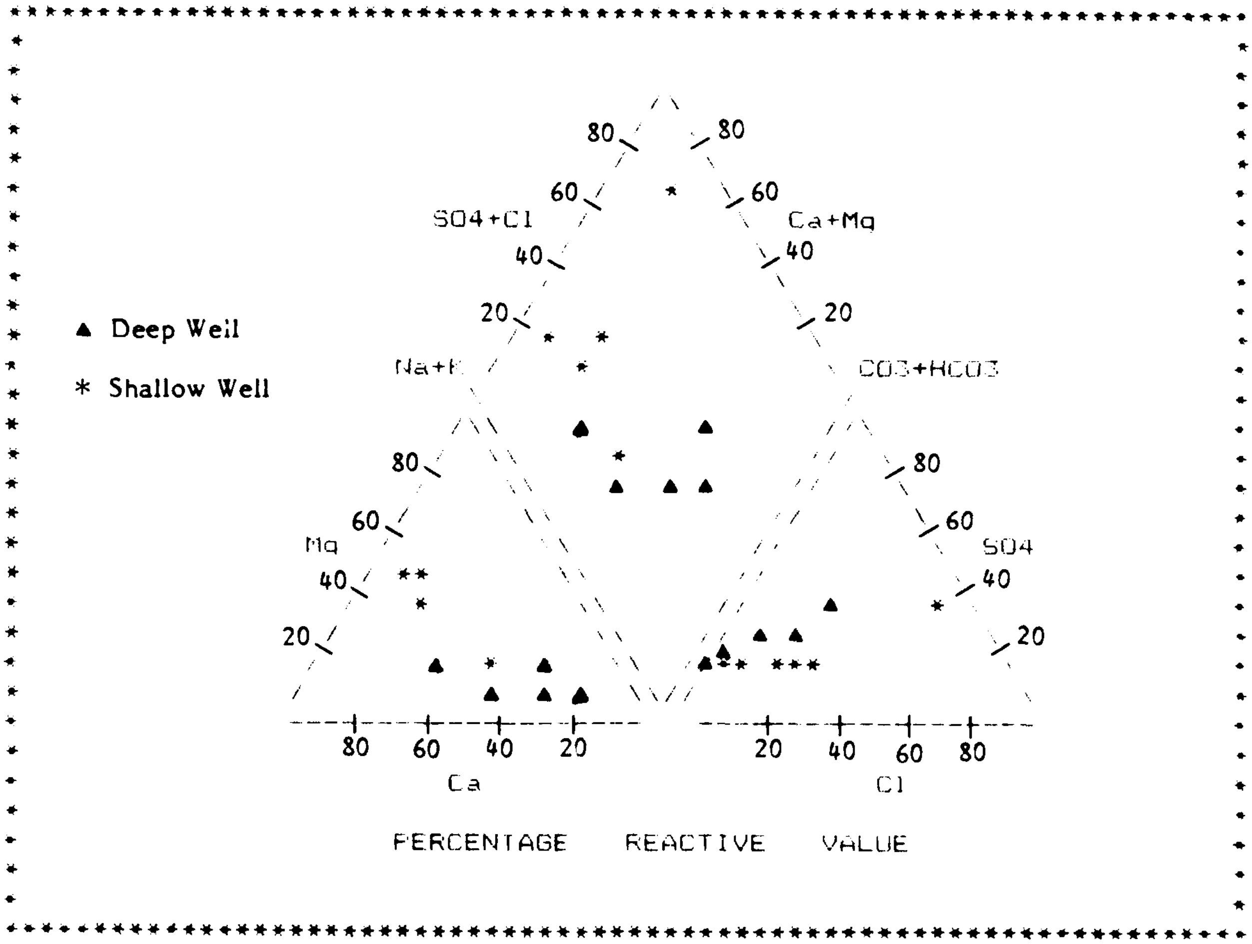

FIGURE IV-12. Groundwater anion/cation balance, West Ditch Wells

87-374

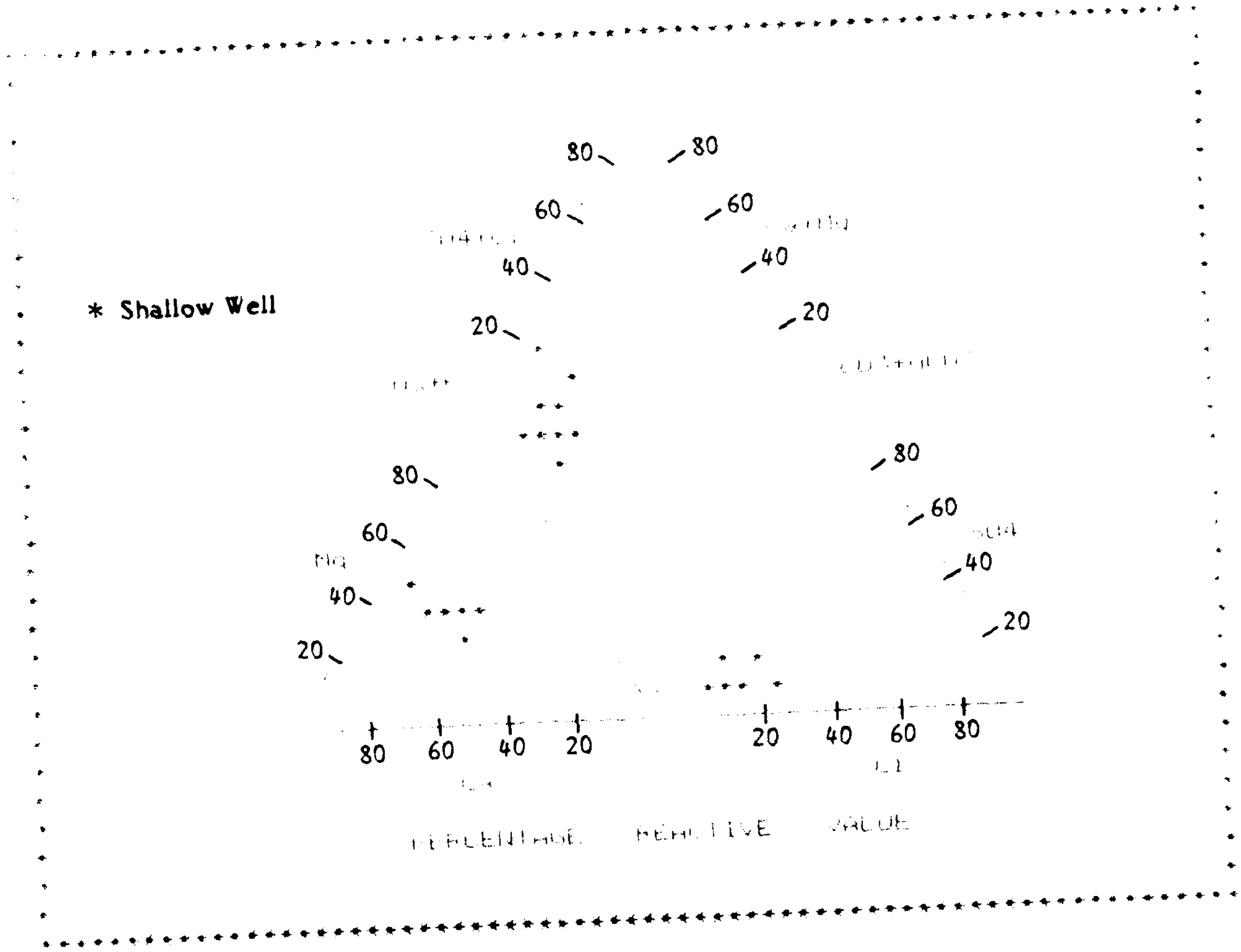

FIGURE IV-13. Groundwater anion/cation balance, Base Production Wells

87-375

6. Analytical Summary

AV confirmed the presence of volatile organic groundwater contamination at all three sites investigated in this effort. The contamination is summarized by area below.

- ACW
  - Trichloroethene (TCE) was found in four shallow wells downgradient from the site.
  - Benzene and related compounds were found in two deep wells downgradient from the site (however, these results were not repeatable).
- West Ditch
  - TCE and Perchloroethylene (PCE) were found in one deep well and one shallow well downgradient from the site. (Perchloroethylene is also known as tetrachloroethene.)
- 7100 Area
  - TCE, PCE, vinyl chloride, benzene and other benzene-related compounds were found in 5 shallow wells downgradient from the site.
  - Benzene was found in one shallow well at the jet test cell, downgradient from the site (this result was not repeatable).
- Base production wells
  - 1,2-dichloroethane was found in Housing Well No. 1. (However, this result was not confirmed in a split sample collected by the base BEE, and is suspect.)

Background samples were collected at each site and along the northeast perimeter of the base. All of these background samples were free of contaminants.

During this effort, we were able to better define the vertical and lateral extent of contamination and the concentrations near the suspected source and downgradient from the site. At the AC&W area, TCE was found at concentrations up to 790 µg/L in shallow wells near the suspected source, and it was also found at 5.7 µg/L in shallow well MAFB-52 about 0.5 miles downgradient. TCE was not found in any deep wells or in any drinking water wells (which are screened even lower than the deep monitoring wells). At the 7100 Area landfill, contamination was found in shallow wells at the edge of the landfill and off base at the gravel pits (west of the site). No contamination was found in deep wells. Further migration beyond the gravel pit was not investigated. Contamination was found in one shallow well (MAFB-47) and one deep well (MAFB-63) along the West Ditch, but no off-site wells were tested to determine downgradient movement. However, sampling conducted by the Central Valley RWQCB detected contamination similar to MAFB-47 in four residential wells along Happy Lane. These wells are located approximately one-half mile west/southwest of MAFB-47.

The California Department of Health Services (DOHS, 1986) has established the action levels for many volatile organic compounds on the Methods 601/602 analysis list, including those identified in the Mather AFB samples (see Table IV-1). We compared the groundwater sampling results to the current DOHS action levels.

There are no DOHS action levels for inorganic parameters, minerals and metals. To evaluate these results, we used the federal drinking water standards for comparison (EPA, 1976; DOHS, 1978 and 1984). Table IV-4 shows the standards for the inorganic parameters tested for at Mather AFB. No standards exist for several inorganic parameters, but none of the samples showed elevated levels of any element or compound that does not have a standard.

B. Significance of Findings

1. Possible Contamination Pathways

A number of geologic factors affect the migration of contaminants from the surface or shallow subsurface into the water table. The most significant is that the base has relatively low topographical relief, so potential runoff rates are low. While most of the upper soils are relatively permeable, there is a well-defined hardpan zone under many areas of the base that will inhibit downward migration. In those areas, where the hardpan layer has been breached (by landfill trenches, etc.) or does not exist, infiltration to the underlying strata may occur.

Surrounding Mather AFB to the north, northwest, and west is an area covered by gold mining dredge tailings. This operation consisted of mining by dredging the upper 20 to 30 feet of sediment and redepositing the gravel and cobbles as mining tailings. Due to the dredging, any hardpan layer that may have been present was destroyed and the permeability of the dredge tailings is high.

One of the most significant geologic features affecting potential contaminant migration in a horizontal direction is the old buried stream channels of the American River (South Fork Gravel Formation). These deposits, which are referred to as superjacent stream channel deposits, are generally quite permeable (approximately 30 ft/day), as much as an order of magnitude higher than the surrounding sediments. Furthermore, the channel deposits are oriented in a northeast-southwest direction parallel to the regional flow of groundwater at Mather AFB.

This major set of stream channel deposits is only one of many such sets deposited as paleochannels of the American River meandered across the valley floor. As the stream continued to deposit fine-grained material on the flood plain and carried coarse materials as stream bed load, a series of high permeable zones (buried stream channels) and low permeable zones (flood plains) built up on top of one another. In some areas, a buried stream channel may be isolated both above and below by the occurrence of fine-grained materials from preceding and anteceding flood plains. Thus, a contaminant reaching the uppermost buried

stream channel would have to take a tortuous path before reaching the next set of channels. In many areas, however, each succeeding stream channel is overlain and hydraulically connected to the next stream channel due to its high permeability, thus greatly increasing the rate of vertical movement. The South Fork and Arroyo Seco Gravels, which underlie many areas of the base, were deposited in this manner. Thus, they do little to retard fluid flow from the surface down to the top of the Laguna Formation or to perched water where it exists. The water table aquifer on base is found in either the Laguna Formation or in the underlying Mehrten Formation. Water percolates slowly through the Laguna Formation, which has much more clay and silt than the overlying gravels. Contaminants travelling slowly through the Laguna Formation would be likely to sorb onto clay or silt particles, which would inhibit passage into the groundwater.

Due to its depth, it is unlikely that the Mehrten Formation would be contaminated from the surface without some direct link such as an ungrouted well bore or extremely high contamination in the overlying aquifer. There is a small head gradient (2-4 ft) between the water table and the uppermost confined aquifer, and the aquifers are separated by 75 to 100 ft of clay and silty sand. There is not enough of a pressure gradient between the aquifers to drive potentially contaminated water from one aquifer to the other.

The production zone for most wells on base begins at approximately 200 to 250 feet below the ground surface. The strata above the production zone generally consist of alternating layers of sand, gravel, silt and clay of varying permeability. The rate of percolation to the production zone is relatively higher in those areas where the overlying beds are predominantly gravel or sand and silt, rather than clay.

In the vicinity of production wells, the drawdown caused by a pumped well results in the highest head differential between the upper strata (possible source of contamination) and the production zone. Therefore, the driving force for contaminant movement between the upper strata and the production zone is highest in the vicinity of the production wells. A number of pathways for contamination in the upper strata to enter the production zone are possible. The first is infiltration and leakage through the confining layer. This is especially critical where the overlying strata are permeable due to gravel near the surface.

One well (Jet Test Cell) is screened from 39-200 feet. This upper or first permeable zone would be the first stratum to be contaminated, and wells that tap these shallower zones in areas where contamination exists are likely to become contaminated.

A second contamination pathway is the vertical movement of pollutants from a contaminated shallow aquifer down the annular space of a well into the lower aquifers. This is a common source of pollution in old wells due to past well construction practices in which no seal or an inadequate seal was provided between surface zones and deeper zones from which water is drawn into the well. This situation can cause problems in two ways. If the well is active, the contaminants will be drawn down through the well's gravel pack and be pumped up into the water supply. If the well is abandoned or not currently pumping, contaminants can flow down the gravel pack and begin to disperse into the aquifer. This contaminated aquifer water may then be pumped into water supplies from the source well or from another deep well downgradient. A third way for contaminants to spread to lower aquifers is through inactive wells that are screened in two or more aquifers. In this scenario, water enters the upper screen, flows down the inside of the well and exits a deeper screen into the aquifer. This assumes that the upper aquifer has a higher piezometric head, which is the case at this base.

2. Site-Specific Descriptions

o Northeast Perimeter

Six wells were installed along the Northeast Perimeter, three screened in the water table aquifer, and three in the uppermost confined aquifer (Mehrten Formation). One of the shallow wells (MAFB 75) was installed to replace MAFB-5 from the Phase II, Stage 1 effort, which was improperly designed and screened entirely in a clay zone. These upgradient wells were intended to determine the quality of water entering the base. None of these wells showed any significantly elevated levels of potential contaminants above naturally-occurring background levels. Water entering the base does not appear to have been degraded at this time, but the potential for off-site contamination remains, due to the geologic setting.

o Site 7 -- 7100 Disposal Area

Seven shallow (Laguna Formation) and five deep (Mehrten Formation) monitor wells were installed at the 7100 disposal area under Phase II, Stage 3 (see Figure IV-14). In addition, three existing shallow wells installed under the Phase II, Stage 1 program -- MAFB-07, 08 and 09 -- were sampled as part of this investigation. All groundwater samples were analyzed for VOC (EPA 601/8020), alkalinity, anions, TDS, minerals, metals, and total cyanide. Samples from MAFB-43, a shallow well located between the Fire Protection Training Area (FPTA) and the landfill were also analyzed for total petroleum hydrocarbons (EPA 418.1) and total phenolics (EPA 420.1).

VOCs were detected in several shallow wells. Monitor wells MAFB-8, 9, 41 and 42, located downgradient of the inactive landfill, all had repeatable levels of TCE near or exceeding the California action level (AL) for at least one round, ranging from 3.8 µg/L for MAFB-9 to 22 µg/L for MAFB-41. Vinyl chloride, a common component of landfill leachate and the potential degradation product of two-carbon halogenated solvents, was detected exceeding the California action level in MAFB-8 and 41, ranging from 2.1 to 9.9 µg/L. Other significant compounds detected in the shallow 7100 area wells located downgradient of the landfill, include PCE below the action level in MAFB-8, 41 and 42; benzene above the action level for at least one round in MAFB-8 and 40; and 1,4-dichlorobenzene with 1,2-dichloroethane above the action level in MAFB-41.

The apparent source of the shallow VOC plume is the old 7100 landfill, which was used to dispose of solvent and POL wastes from 1953 to 1966. The upgradient shallow well, MAFB-44, showed no detectable concentrations of VOCs. However, MAFB-44 is screened in what appears to be perched water zone caused by the oxidation ponds, and may not be truly representative of upgradient conditions in the water table aquifer. MAFB-7, located on the northwestern edge of the landfill, and MAFB-40, located directly downgradient of MAFB-7 in the off-base borrow pit, were both free of significant levels of VOCs (benzene at 1.1 µg/L in MAFB-40 but not repeatable), indicating little lateral spread of the shallow VOC plume. Of the four contaminated downgradient shallow wells (MAFB-8, 9, 41, and 42), the two wells that are furthest from the landfill contain higher levels of TCE,

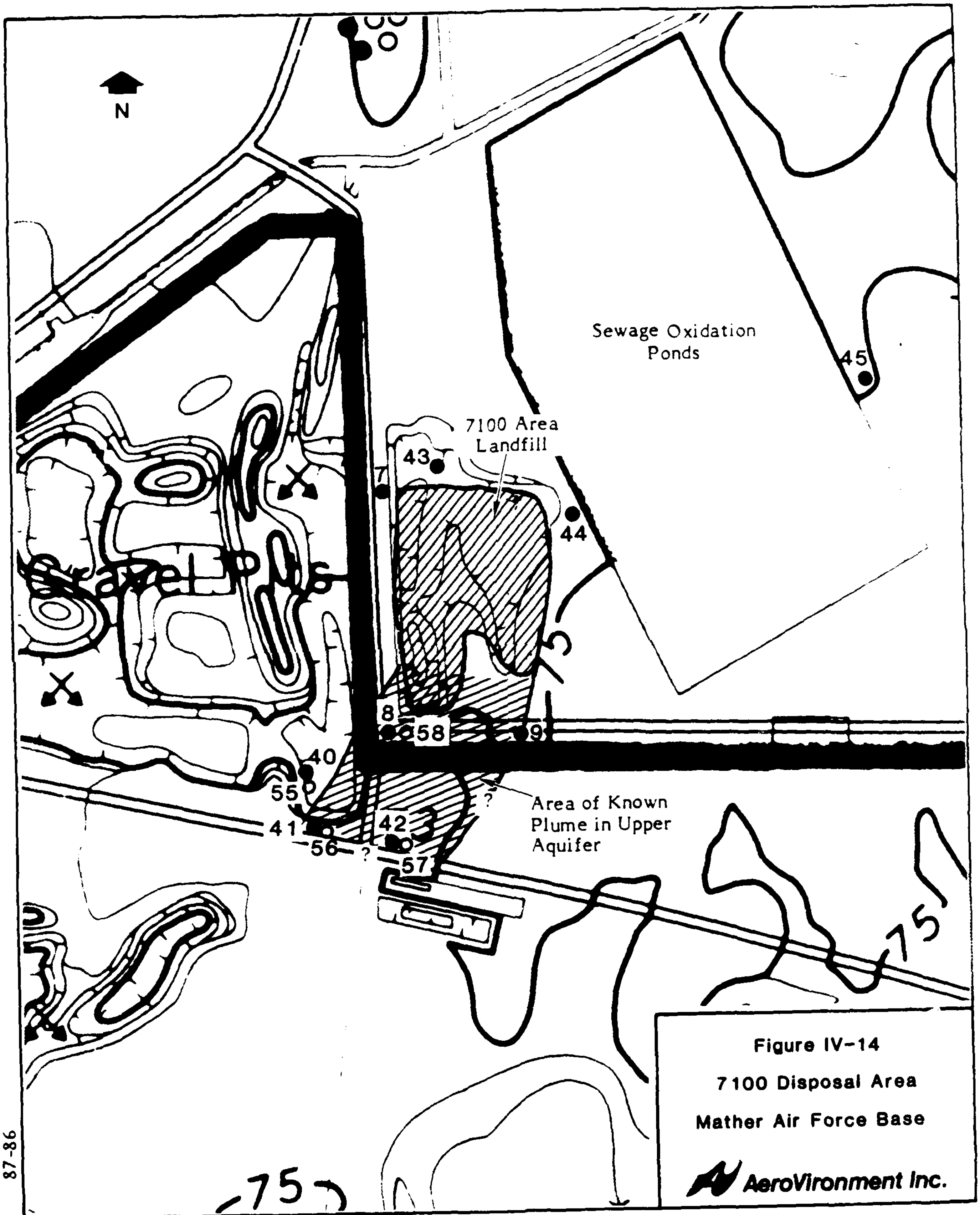

Figure IV-14
7100 Disposal Area
Mather Air Force Base

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March 1987

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Scale: 1" = 400'
● Shallow groundwater monitoring wells
○ Deep groundwater monitoring wells

which suggests that contribution to the plume by the source may have diminished and a higher concentration is moving downgradient. TCE concentrations in MAFB-8, tested in May and June, 1985 under Stage 1, were an order of magnitude higher than the levels found in the same well during this investigation, a year and a half later. A possible explanation for this variance is that the perched water zone is providing increased transport of landfill leachate components during periods when the oxidation ponds are filled. Since the ponds are reportedly used to store excess runoff several times a year, "pulses" of contaminants may be possible.

The shallow water table VOC contamination does not appear to have migrated to the first confined (Mehrten Formation) aquifer. Three of the four deep wells contained no detectable VOCs. Samples from MAFB-58, located near MAFB-8, were found to contain low, repeatable levels of toluene (5.7/1.7 µg/L), well below the action level. Since toluene was not found repeatably in the shallow downgradient wells, its presence in the confined aquifer is unexpected and may possibly be attributed to field or laboratory-induced error. Thus we do not consider the low levels involved significant.

The inorganics data for the shallow monitor wells show elevated levels of several inorganic parameters in the water table aquifer at the 7100 area. All shallow wells downgradient of the landfill had elevated total dissolved solids, up to 890 mg/L for MAFB-7 and 42, which may be indicative of a leachate plume. Correspondingly elevated levels of magnesium, sulfate, iron and manganese were also found in several shallow wells. Iron concentrations exceeded the federal secondary drinking water standard in MAFB-7, 9, and 44, and both iron and manganese exceeded the standard for at least one sampling round in MAFB-8, 42, and 45.

The dissolved iron does not appear to be contributed by the landfill, as elevated concentrations (3.7/11 mg/L) were found in the upgradient well MAFB-44. The elevated iron may be attributable to an area of perched water surrounding the inactive wastewater treatment oxidation ponds.

None of the deep wells were found to have elevated levels of inorganic parameters. Total cyanide was detected near the limit of quantitation

(LOQ) and exceeding the federal primary drinking water standard, in the first round samples from MAFB-56 and 57, but was not detected in the second round samples. Thus we suspect that it is an artifact.

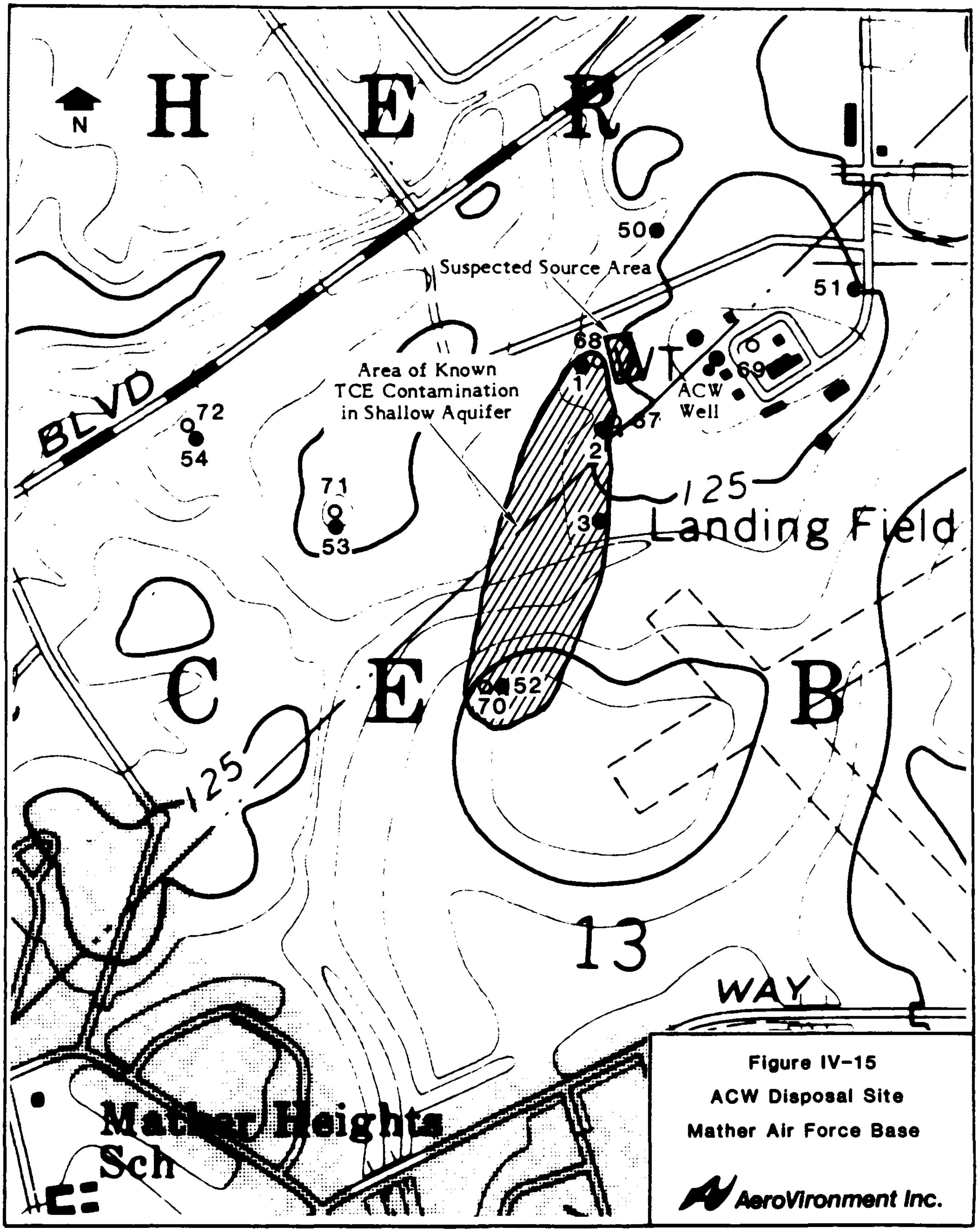
Shallow well MAFB-43, located between the Fire Protection Area (FPTA) and the landfill to measure potential contamination from the FPTA, did not contain significant concentrations of total petroleum hydrocarbons or total phenolics. Phenolics were detected in the first round sample at 24 µg/L but not during second round. A first round field blank sample was also reported to have 30 µg/L phenolics, indicating field- or laboratory-induced sample contamination.

A shallow and deep well pair, MAFB-46 and 59, respectively, installed at the Jet Test Cell downgradient of the production well, showed no significant evidence of contamination. Toluene was detected at 2 µg/L in deep well MAFB-59 for the first sampling round, but was not confirmed in the second round. Benzene was detected in shallow well MAFB-46 at 0.9 µg/L, which is above the California state action level of 0.7 µg/L, but again was for the first round only.

In summary, we have been able to determine that the organic plume extending from the 7100 Area landfill trends toward the south-southwest and does not follow the regional groundwater flow pattern. The site-specific flow direction probably shows the effects of the sewage oxidation ponds. We know that the water table aquifer has been degraded past the base boundaries, but we do not yet know the lateral extent of this degradation. The confined aquifer beneath the site appears to be unaffected by the 7100 landfill.

- Site 12 -- ACW Disposal Area

Eleven monitor wells, five shallow (Laguna Formation) and six deep (Mehrten Formation) were installed to monitor the groundwater underlying the ACW area (see Figure IV-15). Three existing shallow wells installed during the Phase II, Stage 1 program (Wells MAFB 1, 2 and 3) were also sampled as part of this investigation. All groundwater samples were analyzed for VOC (EPA 601/8020), alkalinity, anions, total dissolved solids (TDS), and minerals. The two upgradient



Scale: 1" = 500'

March 1987

● Shallow groundwater monitoring wells
○ Deep groundwater monitoring wells
■ Buildings

87-87

wells, one shallow (MAFB-51) and one deep (MAFB-69), did not contain elevated levels of contaminants. Of the remaining 12 wells sampled, all three Phase II, Stage 1 wells, MAFB 01, 02, 03, and MAFB-52 contained levels of TCE above the California action level (AL) of 5 µg/L for at least one of the two sampling rounds. MAFB-1 was the most contaminated well, with 770/790 µg/L TCE (first round/second round result). MAFB-52, located approximately 1500 feet downgradient of MAFB-1, had TCE levels of 4.1/5.7 µg/L, a much lower concentration than at the head of the plume, but still exceeding the California action level. Well MAFB-2 was installed by another contractor during the Phase II Stage 1 effort. We found that it had not been developed as well as we would have liked, and all of the drilling mud was not cleaned out of the hole. We believe that the water that can be collected from the well is representative of the aquifer, but the well cannot deliver the amount of water necessary to purge three to five volumes before sampling. In this case, it is necessary to pump the well dry and assume that any water that comes into the well after that is formation water. No detectable levels of TCE were found in shallow wells MAFB-53 and 54, located northwest of MAFB-52 in a line perpendicular to the expected shallow plume path. This indicates that the plume's direction is more to the west than we had projected from the water table aquifer gradient. Although MAFB-53 was found to be free of TCE, it is screened in a different gravel zone (unconfined) than the other shallow wells because the upper gravel zone, which is saturated in MAFB-52 and 54, was dry. MAFB-50, a shallow well located north of MAFB-1 to delineate the lateral spread of the shallow TCE plume, was also free of TCE. Figure IV-16 delineates the extent of TCE contamination of the shallow aquifer as determined in this study.

None of the deep wells at the ACW were found to contain detectable TCE, which indicates that TCE contamination of the first (Mehrten Formation) confined aquifer through mixing with the water table aquifer has not occurred. However, samples from three deep wells, MAFB-68, 70, and 71, contained levels of aromatic hydrocarbons. Benzene was detected in MAFB-70 at 22 µg/L in the second round sample, along with lower concentrations of 1,4-dichlorobenzene, ethylbenzene, toluene and xylenes. These concentrations are considered significant because they exceed the California action levels for benzene

and 1,4-dichlorobenzene, but are not repeatable, and are therefore suspect. Elevated levels of alkylated benzenes were found in the first and second round samples from MAFB-68 and 71, although no California action levels were exceeded.

The aromatic compounds detected in the deep wells at the ACW are common components of jet and other fuels. Since their presence in the confined aquifer is unexpected and the source unknown, and since they occurred at low levels and were not repeated, we suspect that these compounds are the result of field- or laboratory-induced contamination. Additional sampling of these wells is necessary to draw conclusions concerning the origin of the aromatic compounds.

The anion, mineral, alkalinity and total dissolved solid results for all the ACW wells were within background levels.

- Site 15 -- West Ditch Area

The West Ditch area includes all areas along the western boundary of the base. Two shallow and four deep wells were placed along the West Drainage Ditch to augment the two existing shallow wells from an earlier study (see Figure IV-16). In addition, a single shallow well (MAFB-49) was installed in the northwest corner of the base behind the commissary to determine upgradient conditions in the water table aquifer. Significantly elevated levels of VOCs were found in one shallow well, MAFB-47, and one deep well, MAFB-63. TCE was detected in the first round sample from MAFB-47 at 7.6 µg/L, and the second round sample showed an increase in TCE concentration to 36 µg/L and 64 µg/L for paired field duplicate results. PCE was also found in MAFB-47 at 2.5 µg/L (first round) and 7.7/18 µg/L (second round duplicate). We suspect that the source of this contamination is an oil skimmer located approximately 100 feet upgradient of MAFB-47, which has reportedly received waste oils and solvents (including TCE) through the West Ditch since its installation in 1967. The variance in TCE and PCE levels between sampling rounds may be caused by fluctuations in the level of standing water in the ditch affecting the percolation of water to the water table aquifer or may be attributable to sampling or analytical error. Deep well MAFB-60, which is located next to MAFB-47, was free of VOC contamination,

indicating no cross-contamination of the first confined aquifer. Trilinear plots of anion and cation data also show that the two aquifers have distinctly different water chemistries, and therefore are probably separate.

PCE, at 12/11 µg/L, was the major contaminant detected in deep well MAFB-63, located at the northern edge of the West Ditch. TCE was the only other repeatable VOC found and was detected at 6.3/1.8 µg/L. Benzene was also detected in the second round sample at 0.9 µg/L, which is above the AL of 0.7 µg/L, but was not found in the first round sample. Since the corresponding shallow well, MAFB-48, showed no contamination, the source of the PCE and TCE contamination of the underlying first confined (Mehrten Fm.) aquifer does not appear to be the drainage ditch. The groundwater gradient is approximately parallel to the northwest base boundary (Placerville Road), which suggests that the source may be off base. An on-base source could be located either close to the Placerville Road boundary upgradient from MAFB-63 or in the northern Main Base Area.

Since all of the wells at this site are situated in a line parallel to the West Ditch, we have been unable to determine the lateral extent of contamination. Figure IV-16 shows the limited areas of groundwater degradation that have been determined up to this date.

- Base Production Wells

Ten base production wells were sampled for VOCs (601/8020), anions, minerals, alkalinity and TDS. Two of these, the K-9 well and the Jet Test Cell well, contained trihalomethanes (THMs). Bromodichloromethane, dibromochloroethane, bromoform and chloroform, at 0.7 µg/L to 2.0 µg/L, were well below the federal primary drinking water standard maximum contaminant level (MCL) of 100 µg/L for total THMs. These compounds are common by-products of drinking water disinfection. The inactive ACW production well had a TCE concentration of 1.8 µg/L, which is significantly lower than the 67 µg/L level reported as part of the Phase II, Stage 1 investigation (Weston, 1985).

An unexpected result was the presence of 1,2-dichoroethane in Family Housing Well 1, which was detected at a concentration of 2.8 µg/L and exceeds the California action level (AL) of 1.0 µg/L. This level is significant,

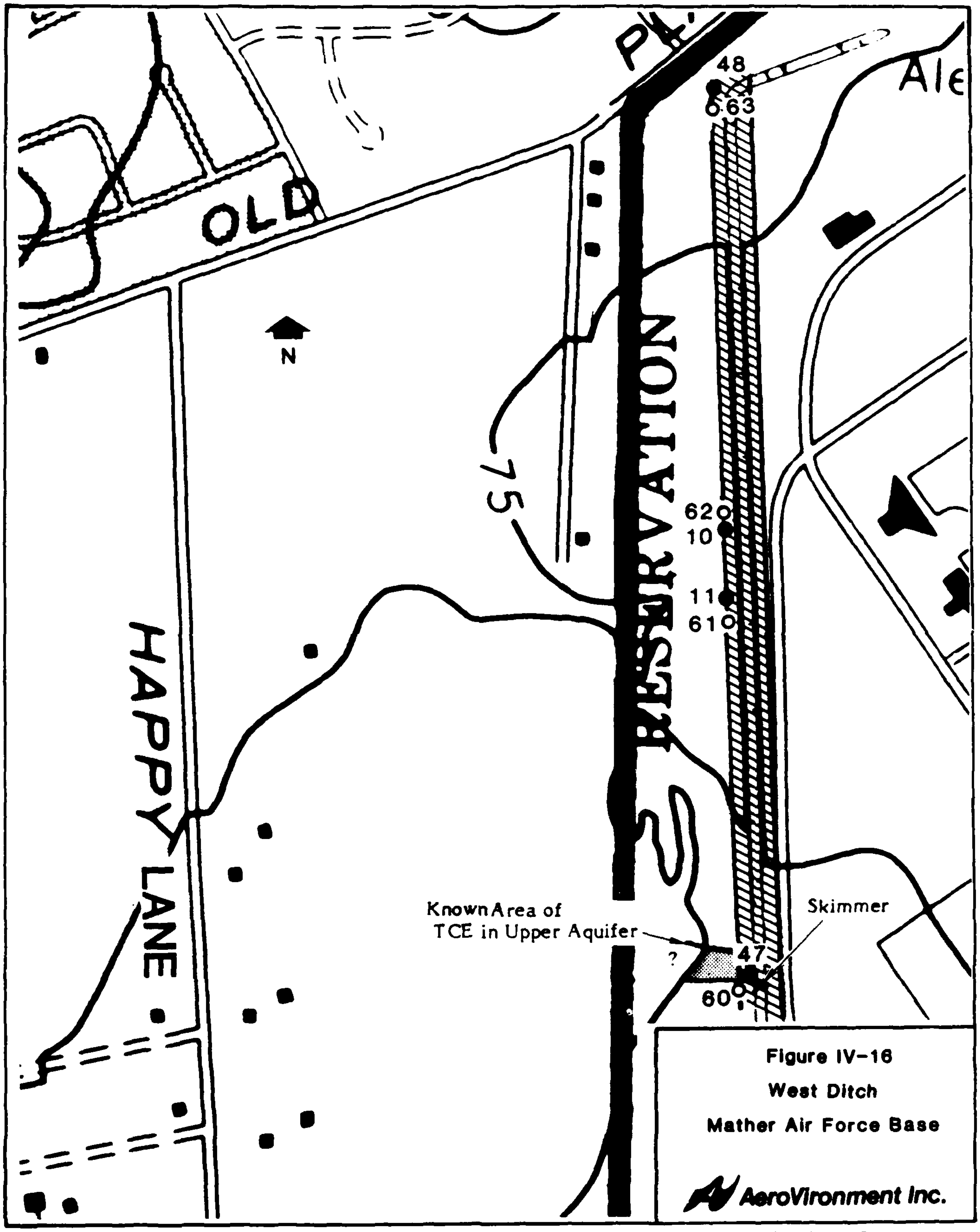


Figure IV-16
West Ditch
Mather Air Force Base

AeroVironment Inc.

Scale: 1" = 400'

March 1987

- ● Shallow groundwater monitoring wells
- O Deep groundwater monitoring wells
- ■ Buildings

based upon the AL, although this compound was found in only one other well, shallow well MAFB-41, which is located about one mile downgradient at the 7100 disposal area. However, split samples collected by the Mather Bioenvironmental Engineer at the same time the AV samples were collected showed no detectable 1,2-dichloroethane in Family Housing Well 1. Therefore, this finding is inconclusive and is not considered valid. Based on previous sampling and analysis records for the Mather base production wells from 1983 through 1986, 1,2-dichloroethane has never before been detected in Family Housing Well 1. However, in March of 1985 this compound was detected in four of the other base production wells (MB-3, MB-4, HW-3, and K-9) with concentrations of up to 3.7 µg/L.

V. ALTERNATIVE MEASURES

Three potential hazardous waste sites were investigated during the Phase II, Stage 3 IRP study at Mather AFB. In addition, the Northeast Perimeter was studied to determine the quality of groundwater entering the base from upgradient locations. All three sites have been investigated previously and groundwater contamination had been identified downgradient from each site. For the most part, shallow soil contamination is not a problem at any of the sites. The results of this study verify the previous results at each of the sites.

Since the basic problem is the same for all sites, the available options for each site will also be the same. This chapter presents the options that may be appropriate for each site (plus the Northeast Perimeter) as part of the IRP Phase II. Groundwater contamination is the primary concern at each site. Shallow soil contamination is not considered to be significant at any of the sites. In the first part of the chapter (V.A), the four basic options are discussed. In the second part of the chapter (V.B), we have listed those options which apply to each of the sites studied in Phase II, Stage 3. Specific site recommendations will be presented in Chapter VI.

A. Description of Options

1. Option 1 - No Action

No further action need be taken if it has been determined that: a) there is no evidence of soil or groundwater contamination or, b) the amount of contamination found is within acceptable limits and poses no serious threat to the environment. Wells would be maintained only for water level information.

2. Option 2 - Continued Monitoring of Existing Wells

Existing wells may continue to be monitored if: 1) a low-level plume is present and the continued monitoring would be used to establish a periodic sampling program as a safety measure; 2) a plume is not now present, but changing

conditions may cause a plume to form; 3) the site is upgradient from municipal or domestic supply wells and the wells could be used as an early warning system to protect water quality. Wells would be sampled and analyzed periodically for specific compounds. Water levels would also be monitored.

Aquifer testing will provide some values of the transmissivity of the aquifers being investigated. The distribution of current monitoring wells is not ideal for aquifer testing at all of the sites. However, the resulting data may provide an indication of groundwater and contaminant migration rates.

3. Option 3 - Install More Wells

More groundwater monitoring wells might be installed if additional wells are required upgradient or downgradient of a site. These wells would be used to verify the quality of water entering the site, or to determine the horizontal or vertical orientation of a plume being generated by a site. Shallow wells would be suggested to determine horizontal migration of known upper aquifer contamination. Deep wells would be used to check for vertical movement into the lower aquifers.

A few sites are upgradient from base supply wells. The lower formations that yield water to the supply wells should probably be monitored. Any deep monitoring wells recommended near production wells would need to be screened in the same zone as the uppermost screened area of the supply well.

4. Option 4 - Corrective Action, Move to Phase IV

If groundwater contamination is proven to be coming from a site, and it poses a serious and immediate threat to the environment, corrective action should be taken. Corrective action (Phase IV) is initiated once the type, magnitude and extent of the contamination and aquifer properties at a particular site have been determined. This could involve extraction, treatment and reinjection of contaminated water; in-situ remediation; supplying alternative water sources; or other available technology developed in an IRP Phase III research study.

Soil excavation is not considered appropriate as part of Phase II for any of the sites at Mather AFB, because the waste sites are generally large and old, so that potential contamination has been widely dispersed from its original source area.

Chapter VI presents AeroVironment's specific recommendations for each site investigated during the Phase II, Stage 3 effort. All of the sites fall into one of the basic categories presented above. In addition to the specific action (if any) recommended, we will present the reasoning for, and objective of, the proposed action.

B. Site-Specific Options

A summary of the site-specific alternative measures is shown in Table V-1.

1. Northeast Perimeter

Option 1 -- No Action

This option would be appropriate for this site because no contamination was found during this study.

Option 2 -- Continued Monitoring of Existing Wells

This option would be appropriate to continue monitoring the upgradient conditions at the base. No contaminants have been found to date.

Option 3 -- Install More Wells

This option would be appropriate if some of the groundwater contamination identified at IRP sites was the result of off-base, upgradient sources. However, current information indicates that upgradient sources are probably not responsible for problems at Mather AFB.

TABLE V-1. Summary of Alternative Measures

Option	Sites			
	Northeast Perimeter	7100 Disposal Area	ACW Disposal Site	West Ditch
1, No action	Appropriate	Not appropriate because of contamination found	Not appropriate because of contamination found	Not appropriate because of contamination found
2, Continued Monitoring	Appropriate to check for changing conditions	Appropriate to check for changing conditions	Appropriate to check for changing conditions	Appropriate to check for changing conditions
3, Install More Wells	Not necessary, no contamination	Appropriate to further define lateral spread of contamination	Appropriate to further define lateral spread of contamination	Appropriate to further define upgradient and downgradient conditions
4, Corrective Action	Not necessary, no contamination	May ultimately be needed, but plume not yet fully defined	May ultimately be needed, but plume not yet fully defined	May ultimately be needed, but plume not yet fully defined

Option 4 -- Corrective Action, Move to Phase IV

This option is not justified because no contamination was found in upgradient wells.

2. Site 7 -- 7100 Disposal Area

Option 1 -- No Action

This option is not appropriate because TCE, vinyl chloride and other chemical contamination has been identified in wells downgradient from this site.

Option 2 -- Continued Monitoring of Existing Wells

This option is appropriate for this site because of the contamination identified in groundwater monitoring wells.

Option 3 -- Install More Wells

This option is appropriate because of the contamination found in groundwater downgradient from this site. Additional wells are justified to further define the spread of contamination from this site, particularly off base. Existing wells would continue to be monitored. (See Chapter VI for recommended well design and placement.)

Option 4 -- Corrective Action, Move to Phase IV

Although this option will ultimately be appropriate for this site, it is premature to move to Phase IV at this time. The full magnitude of the contamination at this site has not been fully defined.

3. Site 12 -- ACW Disposal Site

Option 1 -- No Action

This option is not appropriate because TCE contamination has been identified in wells downgradient from this site.

Option 2 -- Continued Monitoring of Existing Wells

This option is appropriate for this site because of the contamination identified in groundwater monitoring wells.

Option 3 -- Install More Wells

This option is appropriate because of the contamination found in groundwater downgradient from this site. Additional wells are justified to further define the spread of contamination from this site, particularly off base. Existing wells would continue to be monitored. (See Chapter VI for recommended well design and placement.)

This site is upgradient from base supply wells. The formations that yield water to the supply wells should probably be monitored. Any monitoring wells recommended near production wells would need to be screened in the same zone as the uppermost screened area of the supply well(s).

Option 4 -- Corrective Action, Move to Phase IV

Although this option will ultimately be appropriate for this site, it is premature to move to Phase IV at this time. The full magnitude of the contamination at this site has not been fully defined.

4. Site 15 -- West Ditch

Option 1 -- No Action

This option is not appropriate at this site because TCE and PCE

contamination have been identified in groundwater monitoring wells downgradient from this site.

Option 2 -- Continued Monitoring of Existing Wells

This option is appropriate for this site because of the contamination identified in groundwater wells.

Option 3 -- Install More Wells

This option is appropriate because of the contamination found in the groundwater downgradient from the site. Additional wells are justified to further define the spread of contamination from this site, particularly off base. Existing wells would continue to be monitored. (See Chapter VI for recommended well design and placement.)

Option 4 -- Corrective Action, Move to Phase IV

Although this option will be appropriate for this site, it is premature to move to Phase IV at this time. The full magnitude of the contamination at this site has not yet been fully defined. Contamination has been identified only near the suspected source (no monitoring has occurred off base).

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VI. RECOMMENDATIONS

This chapter outlines AV's recommendations for further work related to the IRP program at Mather AFB. As the Air Force requested, we have assigned each site to one of the categories defined below.

Category I: Sites where no further action (including remedial action) is required.

Category II: Sites requiring additional monitoring or work to quantify or further assess the extent of current or future contamination.

Category III: Sites that will require remedial action (i.e., that are ready for IRP Phase IV action).

The three sites investigated during the Stage 3 effort are all considered to be Category II sites. Each has been found to be a source of groundwater contamination; however, the full extent of the contaminant plume has not been defined. The Northeast Perimeter was also studied as part of this project. Although it is not a discrete site, we have prepared recommendations for it as if it were. Table VI-1 summarizes our recommendations.

One general recommendation is to consolidate the IRP efforts in order to look at all of the sites and all of the monitoring wells together. There would be great advantage in sampling all wells during the same intervals (and at the same time), so that contamination problems could be evaluated in a comprehensive context.

Northeast Perimeter -- Category II

All six wells along the Northeast Perimeter of Mather AFB were found to be free of contamination. Sampling in 1985 also showed no contamination. These results indicate that the water entering base along the Northeast Perimeter from

TABLE VI-1. Summary of recommendations.

Site	Recommendation
Northeast Perimeter (Category II)	- Continue monitoring upgradient conditions by sampling the 6 existing wells semiannually and test for VOAs (Method 601).
	- Abandon monitoring Well MAFB-5, in accordance with state and local requirements.
No. 7, 7100 Disposal Area (Category II)	- Install 3 additional groundwater monitoring wells, each in the water table aquifer and each downgradient from the existing wells (the new wells would be off base).
	- Sample the 15 existing wells plus the 3 new ones semiannually and test for VOAs (Methods 601 and 602), metals and minerals (Method 200).
No. 12, ACW Disposal Site (Category II)	- Install 3 additional groundwater monitoring wells, each in the water table aquifer and each downgradient from the existing wells.
	- Sample the 14 existing wells plus the 3 new ones semiannually and test for VOAs (Method 601). In addition, test samples from deep wells for Method 602 compounds at least once more.
No. 15, West Ditch (Category II)	- Install 4 additional groundwater monitoring wells, each in the water table aquifer. One well would be located upgradient of the west ditch skimmer and 3 would be downgradient, west of Happy Lane.
	- Sample the 9 existing wells plus the four new ones semiannually and test for VOAs (Method 601/602).
	- Install one additional deep well which has been previously proposed as a recommendation of Phase II, Stage 2.
	- Research all private wells within 1.0 mile of the site, and sample as necessary.

the two aquifers of concern (the water table and first confined water) is not contributing to groundwater contamination problems identified at Stage 3 sites on base. Based upon the depths currently monitored no additional wells are necessary as part of the monitoring for ACW or 7100. Additional wells are necessary to monitor conditions at Stage 2 sites, but these have previously been recommended as part of the Stage 2 report. No corrective action is needed. However, monitoring should be continued to verify the upgradient conditions remain unchanged and to help in evaluating problems at downgradient sites on base. The six existing wells (MAFB-64, 65, 66, 73, 75 and 76) should be sampled semiannually as part of a sampling program for all existing Category II sites. The samples should be tested for volatile organics using EPA Methods 601 and 602. In addition, water levels at MAFB-4 and 6 should be measured on a semiannual basis.

Since we consider MAFB-5 (from Phase II, Stage 1) to be of no monitoring value because the screened interval is located in a clay zone, we recommend that it be sealed in accordance with state and county guidelines by grouting the well from bottom to top.

Site 7 -- 7100 Disposal Area - Category II

Seven shallow monitoring wells and five deep monitoring wells were installed and sampled as part of the Stage 3 effort. In addition, three existing shallow monitoring wells were sampled. Five of six downgradient shallow wells were found to be contaminated with one or more of the following compounds: TCE, PCE, vinyl chloride, DCA and 1,4-Dichlorobenzene. TCE was also identified in wells sampled in 1985 from Stage 1. TCE was found to be higher in wells located off the base than in wells located at the edge of the site. An increase in concentration was observed in wells to the south and southwest. Upgradient shallow wells are uncontaminated. Although the shallow monitoring well at the Jet Test Cell showed a level of benzene above the DOHS action level, it was not repeatable and we suspect it to be lab or sampler error. According to the analytical data, the deep wells are free of contamination.

TCE in the shallow aquifer has been identified off base. The leading edge of the plume has not been identified, but it appears to extend beyond the off-base gravel pit immediately southwest of the site. From samples collected to date, the plume appears to be moving to the south, southwest and, to a lesser degree, the west. Three additional shallow monitoring wells should be installed into the water table aquifer to identify the downgradient extent of the contamination. One well should be located 1/4 to 1/2 mile south of MAFB-42 to determine the southern and eastern extent of plume migration. The other two wells should be located 1/4 to 1/2 mile downgradient from MAFB-40 and 41. These three wells, in combination with MAFB-59, would form an arc from south to west, about 1/2 mile from the site, and would be used to monitor the extent of contamination. The exact locations of these wells should not be determined until aquifer tests are run on the existing shallow wells to determine site-specific conditions. No known domestic or irrigation wells are available for additional monitoring in this area.

The 15 existing wells and three new wells should be sampled semiannually and the water tested for volatile organics by EPA Methods 601 and 602 and for metals and minerals by EPA Method 200.7. If further testing of the deep wells shows no contaminants (particularly MAFB-46 where benzene was identified but not repeated), sampling from deep wells should be reduced to once a year.

Site 12 -- ACW Disposal Site - Category II

Five shallow monitoring wells and six deep monitoring wells were installed and sampled as part of the Stage 3 effort. In addition, three existing shallow monitoring wells were sampled. Four of the six downgradient shallow wells were found to be contaminated with TCE. Contamination in the three wells near the suspected source ranged from 790 µg/L to 25 µg/L. These values are slightly higher than those reported from Stage 1 sampling in 1985. One well located about 1/4 mile further downgradient contained about 5 µg/L, a substantial reduction. All upgradient wells were free of contamination. Two deep downgradient wells were found to contain low levels of aromatic hydrocarbons, but these results were not repeatable and we suspect them to be sampling or laboratory error. Thus we believe the deep wells to be free of contamination.

The ACW site is located directly upgradient from two base production wells in the base housing area. The combination of the site's location relative to drinking water wells, plus the high levels of TCE observed near the suspected disposal pipe location are cause for further study. The leading and southern edges of the plume have not yet been identified, but it appears at this time that MAFB-52 (with only 5 µg/L) is near the leading edge. However, there is no indication as to whether the plume is extending to the south. Three additional shallow monitoring wells should be installed into the water table aquifer to identify the southern and western edge of the plume. One well should be located about 800 ft southeast of MAFB-52 to monitor conditions south of the existing set of downgradient wells (MAFB-54, 53 and 52). The other two wells should be located about halfway between MAFB-52 and the production wells closest to the site (FH-3 and FH-6). These new wells would not be located near enough to the production wells to require screening in the lower zones. In addition they should be sited only after aquifer tests are run on the existing shallow wells to determine site-specific conditions. The result would be three rows of shallow wells located between the source and the production wells. These rows, in addition to the existing deep wells, should provide information about the three-dimensional movement of TCE from the ACW.

The 14 existing wells and three new wells should be sampled semiannually and the water tested for volatile organics by EPA Method 601. The initial set of samples should also be tested for aromatic compounds (by EPA Method 602) to determine whether the benzene and other aromatics detected in the deep wells during Stage 3 are actually present. If no aromatics are found, no further testing for those compounds is necessary. If they are found, additional study will be necessary.

Site 17 -- West Ditch - Category II

Three shallow monitoring wells and four deep monitoring wells were installed and sampled as part of the Stage 3 effort. In addition, two existing shallow monitoring wells were sampled. The shallow well near the skimmer was found to be contaminated with TCE and PCE. The deep well at the north end of the ditch was also contaminated with TCE, PCE and benzene. No TCE contamination was found during Stage 1 sampling in 1985 (no TCE was found in the Stage 1 wells,

MAFB-10 and 11, during this stage either). No upgradient or "far" downgradient wells exist at the West Ditch, so it is difficult to assess the extent of the groundwater problem; however, shallow off-base domestic wells along Happy Lane have been found to contain significant levels of TCE (Happy Lane Groundwater Investigation; CRWQCB, August, 1984).

The West Ditch site is located along the western border of Mather AFB. Private homes which use well water are located within 1/2 mile downgradient of the site. Four additional shallow monitoring wells drilled into the water table aquifer are needed to determine the extent of groundwater contamination and to verify the source of the TCE. The first well should be located upgradient from MAFB-47 to verify that the West Ditch site is the source of the TCE/PCE. The other three monitoring wells should be located downgradient, on the west side of Happy Lane. These wells would be used to determine the length and width of the plume. No additional deep wells are considered necessary at this time. However, a deep well has been proposed as part of Stage 2 recommendations and should be installed. As an upgradient well it would help to determine the source of TCE/PCE in the deep well at the north end of the west ditch. Also, an extensive research and sampling program is necessary to determine the extent of the problem in private wells along Happy Lane. Research should be conducted on the age, condition, depth and historical sampling results of all private wells within a 1 mile of the West Ditch. The result will be a better understanding of the usefulness of these private wells in investigating contamination from the West Ditch.

The nine existing wells, the four new shallow wells and any appropriate private wells should be sampled semiannually and the water tested for volatile organics by EPA Methods 601 and 602. (We assume that the upgradient deep well will also be sampled semiannually, but as part of the Stage 2 site with which it is associated.)

APPENDIX A

Definitions, Nomenclatures and Units of Measurement

A. DEFINITIONS, NOMENCLATURES AND UNITS OF MEASUREMENT

ACUREX: Laboratory selected to analyze samples collected during field investigation at Mather Air Force Base.

ACW: Air command and warning area.

AF: Air Force.

AFB: Air Force Base.

Ag: Silver.

ALLUVIUM: Materials eroded, transported and deposited by streams.

ANALYTE: The specific component measured in a chemical analysis.

ANION: A negatively charged ion.

ANOMALY: A local feature distinguishable in a geophysical measurement.

AQUICLUDE: Poorly permeable formation that impedes groundwater movement and does not yield to a well or spring.

AQUIFER: A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring.

AQUITARD: A geologic unit that impairs groundwater flow.

AROMATIC: Description of organic chemical compounds in which the carbon atoms are arranged in a ring associated with special electron stability. Aromatic compounds are often more reactive than nonaromatics.

ARTESIAN: Groundwater contained under hydrostatic pressure.

As: Arsenic.

AV: AeroVironment Inc.

AVGAS: Aviation Gasoline.

Ba: Barium.

BAILER. A tubular piece of equipment with a check valve at one end consisting of a simple ball and seat arrangement. It is lowered down a well via a rope and pulley system to collect well water samples.

BASEMENT: The oldest rocks in a given area, a complex of metamorphic and igneous rocks that underlies all the sedimentary formations. Usually Precambrian or Paleozoic in age.

BED: A characteristic of sedimentary rocks in which parallel planar surfaces separating different grain sizes or compositions indicate successive depositional surfaces that existed at the time of sedimentation.

BEDFORMS: Morphologic features having various systematic patterns of relief, created by the conditions of flow at the dynamic interface between cohesionless sediment and a fluid.

BEE: Bioenvironmental Engineer

BENTONITE: A clay formed from the decomposition of volcanic ash that has great ability to absorb or adsorb water and to swell accordingly. It is commonly used to seal a groundwater well in a nonscreened area.

BES: Bioenvironmental Engineering Services.

BEYLIK DRILLING, INC.: Drilling company selected to install the monitor wells at Mather Air Force Base.

BIODEGRADABLE: The characteristic of a substance to be broken down from complex to simple compounds by microorganisms.

BLS: Below land surface.

BLIND DUPLICATE: A field replicate sample submitted to a laboratory as a routine sample for analysis without any identification as a quality control sample. The purpose of blind duplicate samples is to monitor sampling and analytical precision without the introduction of laboratory bias.

BNA: Base/neutral acid fraction of priority pollutants.

Br: Bromine.

BRAIDED STREAM: A stream flowing in several dividing and reuniting sections, the cause of the division being the obstruction by sediment deposited by the stream.

Ca: Calcium.

CAPILLARY FRINGE: The zone overlying the saturated zone, which contains capillary interstices that may be filled with water.

CATION: A positively charged ion.

Cd: Cadmium.

CHAIN-OF-CUSTODY: The documentation of sample possession, beginning at collection and ending at analysis. A chain-of-custody form accompanies samples and records the data and time of each sample possession transfer.

CHRISTIE BOX: A small reinforced concrete box with a locking steel cap that is cemented to the ground. It is used to complete a well at the surface so that the top is flush to the ground.

Cl: Chlorine.

CLAY: A sediment particle having a diameter less than 1/512 mm.

COBBLES: A collective term for sediments whose particle size is between 64 and 256 mm.

CONDUCTIVITY: A property of an electric conductor defined as the electrical current per unit area divided by the voltage drop per unit length.

CONDUCTOR CASING: Cylindrical well material used to seal off the upper water-bearing zone.

CONFINED AQUIFER: An aquifer bounded above and below by impermeable strata or by geologic units distinctly less permeable than the aquifer itself.

CONFINING UNIT: An aquitard or other poorly permeable layer that restricts the movement of groundwater.

CONSOLIDATION: The adjustment of a saturated soil in response to increased load. Involves the squeezing of water from the pores and a decrease in void ratio.

CONTAMINATION: The degradation of natural water quality or soil to the extent that its usefulness is impaired. This term does not imply any specific limits, since the degree of contamination that is permissible depends on the use for which the water is intended.

CONE OF DEPRESSION: The depression produced in a water table or piezometric surface by pumping or artesian flow.

Cr: Chromium.

CRETACEOUS: One of the eras of geologic time, lasting from 136 to 64 million years before the present.

Cu: Copper.

DBCP: Dibromochloropropane.

DCE: Dichloroethene.

DH: Drill hole.

DIELECTRIC CONTRAST: A contrast between conducting materials and non-conducting materials.

DISPOSAL FACILITY: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water and at which waste will remain after closure.

DISPOSAL OF HAZARDOUS WASTE: The discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that it or any of its constituents may enter the environment or be emitted into the air or discharged into any waters, including groundwater.

DoD: Department of Defense.

DOHS: California Department of Health Services.

DOWNGRADIENT: In the direction of decreasing hydraulic static head; the direction in which groundwater flows.

DRILLING: Air rotary drilling.

DRINKING QUALITY WATER: Water meeting primary drinking water standards.

DUMP: An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics. Dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers.

EARTH TECHNOLOGY CORPORATION: Company selected to conduct the geophysical surveys at Mather Air Force Base.

EDB: Ethylenedibromide

EFFECTIVE PRECIPITATION: The mean annual precipitation minus the mean annual evaporation.

ELECTROMAGNETIC SURVEY: A geophysical method employing electromagnetic waves at the earth's surface. When waves impinge on a conducting formation or saturated soil, they induce currents that are detected by an instrument at the surface.

E-LOG: Collective term for a number of geophysical logs run in an open borehole to help determine the lithology of the penetrated formations.

EM: Electromagnetic survey.

EOCENE: Strata of the Tertiary era, between the Paleocene and Oligocene, lasting from 60 to 40 million years before the present.

EPA: U.S. Environmental Protection Agency.

E.P. TOXICITY: Extraction procedure toxicity, one criteria for determining whether a material is a hazardous waste. The E.P. toxicity test is a leachate simulation established by EPA to determine whether toxic material will leach from the waste over time. The test method is specified in 40 CFR 261, Appendix II.

EROSION: The wearing away of land surface by wind, water, or chemical processes.

EXPLOSIMETER: Monitoring device for detecting explosive gases in ambient air by reading percent of lower explosive limit.

F: Fluorine.

FAA: Federal Aviation Administration.

Fe: Iron.

FIELD BLANK: A blank sample that is kept in the sample storage area throughout the sampling activities. After activities are over, this sample is analyzed to see whether the storage environment has introduced contaminants into the samples.

FINING-UP CYCLE: Referring to a portion of a sedimentary sequence exhibiting a vertical change in grain size from coarse- to fine-grained. Fining-up cycles as seen in outcrop, drill core or drill cuttings are characteristic of certain depositional environments depending on the vertical scale of the cyclic deposit.

FLOOD PLAIN: The lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including areas subject to a one percent or greater chance of flooding in any given year.

FLOW PATH: The direction or movement of groundwater as governed principally by the hydraulic gradient.

FLUVIAL: Of, or pertaining to rivers; produced by river action.

FORMATION: The basic unit for the naming of rocks in stratigraphy: a set of rocks that are or once were horizontally continuous. that share some distinctive feature of lithology, and that are large enough to be mapped.

FPTA: Fire Protection Training Area.

GC/MS: Gas chromatograph/mass spectrometer, a laboratory instrument for separating and identifying unknown organic compounds.

GEOPHYSICAL SURVEY: The exploration of an area in which geophysical properties and relationships unique to the area are mapped by one or more methods.

GPR: Ground-penetrating radar.

GRAVEL: A collective term for sediments whose particle sizes are greater than 2 mm.

GRAVEL PACK: Sand or gravel that is smooth, uniform, clean, well-rounded and siliceous. It is placed in the annulus of the well between the borehole wall and the well screen to prevent formation material from entering the screen.

AD-A194 900 INSTALLATION RESTORATION PROGRAM PHASE 2 3/10
CONFIRMATION/QUANTIFICATION STAGE 3(U) AEROVIRONMENT
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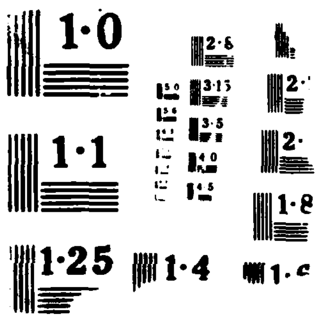
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GROUND-PENETRATING RADAR: A method used in a geophysical survey in which radar transmissions detect the boundaries between media with different electrical and physical properties in order to locate buried objects and estimate the thickness of landfill covering layers.

GROUNDWATER: Water in the saturated zone beneath the land surface that is under atmospheric or artesian pressure.

GROUNDWATER RESERVOIR: The earth materials and open spaces beneath the land surface that contain groundwater.

GROUT: A cement/sand mixture that provides a water-tight seal between the well casing and the borehole wall.

HARDPAN: A layer of strongly cemented sediments often found a short distance below the ground surface.

HARM: Hazard Assessment Rating Methodology.

HALOGENATED: An organic compound containing fluorine, chlorine, bromine, iodine, or astatine.

HAZARDOUS SUBSTANCE: Under CERCLA, the definition of hazardous substance includes:

1. All substances regulated under Paragraphs 311 and 307 of the Clean Water Act (except oil)

2. All substances regulated under Paragraph 3001 of the Solid Waste Disposal Act

3. All substances regulated under Paragraph 112 of the Clean Air Act

4. All substances that the Administrator of EPA has acted against under Paragraph 7 of the Toxic Substance Control Act

5. Additional substances designated under Paragraph 102 of the Superfund bill

HAZARDOUS WASTE: As defined in RCRA, a solid waste, or combination of solid wastes, that, because of its quantity, concentration, or physical, chemical or infectious characteristics, may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness or may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HAZARDOUS WASTE GENERATION: The act or process of producing a hazardous waste.

HDPE: High density polyethylene.

HEAVY METALS: Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but become toxic at higher concentrations.

Hg: Mercury.

HOLDING TIME: The amount of time after sampling in which a sample must be analyzed or extracted, according to the EPA.

HQ ATC: Headquarters Air Training Command.

HYDROCARBONS: Organic chemical compounds composed of hydrogen and carbon atoms chemically bonded. Hydrocarbons may be straight chain, cyclic, branched chain, aromatic, or polycyclic, depending upon the arrangement of the carbon atoms. Halogenated hydrocarbons are hydrocarbons in which one or more hydrogen atoms has been replaced by a halogen atom.

I.D.: Inside diameter.

IGNEOUS: Formed by solidification from a molten or partially molten state.

INDURATED: Sediments hardened by heat, pressure or natural concentration.

INFILTRATION: The movement of water through the soil surface into the ground.

IRP: Installation Restoration Program.

JP-4: Jet Propulsion Fuel Number Four, military jet fuel.

K: Potassium.

LACUSTRINE: Produced by or pertaining to lakes.

LAGUNA FORMATION: A stratigraphic section comprised of compacted layers of silts, sands, and clays, with hardpan in surface soils derived from the erosion of the Sierra Nevada Mountains.

LEACHATE: A solution resulting from the separation cr dissolving of soluble or particulate constituents from solid waste by the percolation of water.

LEACHING: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or dissolved and carried away by water.

LIMIT OF QUANTITATION: The lower limit of the concentration or amount of a substance that must be present before a method is considered to provide quantitative results. By convention, LOQ = $10s_o$, where s_o is the estimate of the standard deviation at the lowest level of measurement.

LINER: A continuous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill, or landfill cell that restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate.

LITHOLOGY: The systematic description of rocks, in terms of mineral composition and texture.

LOAM: A soil composed of a mixture of clay, silt, sand and organic matter.

LOQ: Limit of quantitation.

MAFB: Mather Air Force Base groundwater monitoring well.

MB: Main Base water production well.

MAGNETOMETER SURVEY: A measurement of magnetic intensity in an area of earth.

MAJCOM: Major command.

MDL: Method Detection Limit.

MEANDERING STREAM: A stream that develops broad, semicircular curves by eroding the outer bank of a curve and depositing sediment against the inner bank.

MEHRTEN FORMATION: A stratigraphic section that comprises volcanic-derived angular gravels and sand, dark mafic rock fragments, and mudflows. It is discontinuous, with abundant cross-bedding and cut-and-fill structures.

MEK: Methyl ethyl ketone.

MEMBER: A lithologic entity within a formation.

MESOZOIC: One of the eras of geologic time, following the Paleozoic and succeeded by the Cenozoic era, lasting from 230 to 70 million years before the present.

METALS: See "Heavy Metals."

METAMORPHIC: Segregation of certain minerals into lenses and bands accomplished by altering rock composition, texture and internal structure through pressure, heat and the introduction of new chemical substances.

Mg: Magnesium.

MILLIEQUIVALENT: The quantity of a substance that gains or loses 1×10^{-3} mole of electrons.

MN: Manganese.

MOGAS: Motor gasoline.

MONITORING WELL: A well used to measure groundwater levels and to obtain samples.

MOUNDING: An increase in groundwater elevation beneath an area of recharge.

MSL: Mean sea level.

MUD ROTARY DRILLING: A drilling method for boring holes in the earth that employs water to remove cuttings from the hole.

Na: Sodium.

NO_2^-: Nitrite.

NO_3^-: Nitrate.

NONINTRUSIVE: Method of investigation in which information may be gained without disturbing the object being investigated.

OD: Outside diameter.

O_2: Oxygen molecule.

OEHL: Occupational and Environmental Health Laboratory.

O&G: Oil and grease.

ORGANIC: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon.

OVA: Organic vapor analyzer.

OVERBANK DEPOSITS: All sediments deposited by a river onto a valley floor outside of the stream channel.

OVM: Organic vapor meter.

OXYGEN DEFICIENCY: This occurs when air contains less than 16% oxygen, at which point it is insufficient to support human life.

PALEO-CHANNEL: A stream channel that existed during some previous epoch of the earth's development.

PALEOZOIC: One of the eras of geologic time, following the Late Precambrian and succeeded by the Mesozoic era, lasting from 600 to 230 million years before the present.

Pb: Lead.

PCB: Polychlorinated biphenyl; liquids used as a dielectrics in electrical equipment.

PCE: Tetrachloroethene (Perchloroethylene).

PERCHED WATER TABLE: A water table above a relatively impermeable zone underlain by unsaturated rocks of sufficient permeability to allow groundwater movement.

PERCOLATION: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.

PERMEABILITY: The capacity of a porous rock, soil or sediment to transmit a fluid without damage to the structure of the medium.

PERSISTENCE: As applied to chemicals, those that are stable and remain in the environment in their original form for an extended period of time.

PESTICIDE: An agent used to destroy pests. Pesticides include such specialty groups as herbicides, fungicides, insecticides, etc.

pH: The negative logarithm of the hydrogen ion activity that indicates the acidity or basicity of a sample.

PHENOL: Total recoverable phenolics -- any of various acidic compounds analogous to phenol and regarded as hydroxyl derivatives of aromatic hydrocarbons.

PIEZOMETRIC HEAD: The upward hydrostatic pressure created in a confined aquifer that causes water to rise above the confining layer when penetrated by a well.

PLEISTOCENE: Strata of the Tertiary Era, between the Holocene and Pliocene, lasting from 1 million to 10,000 years before the present.

PLIOCENE: Strata of the Tertiary Era, between the Pleistocene and Miocene, lasting from 10 to 1 million years before the present.

PLUME: The spreading of a contaminant in a fanning-out manner from the source.

$PO_4^{=}$: Phosphate.

POL: Petroleum, oil and lubricants.

POLLUTANT: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose.

POROSITY: The ratio, in percent, of the volume of void space to the total volume of sediment or rock.

POTENTIOMETRIC SURFACE: The imaginery surface to which water in an artesian aquifer would rise in tightly screened wells penetrating it.

PPB: Parts per billion by weight, equivalent to µg/kg, or µg/l for water.

PPM: Parts per million by weight, equivalent to µg/g, or mg/l for water.

psi: Pounds per square inch.

PRECIPITATION: Rainfall.

QA/QC: Quality assurance/quality control.

RCRA: Resource Conservation and Recovery Act.

RECEPTORS: The group or resource on which a waste contamination source might impact.

RECHARGE: The addition of water to the groundwater system by natural or artificial processes.

RECHARGE AREA: A surface area in which surface water or precipitation percolates through the unsaturated zone and eventually reaches the zone of saturation. Recharge areas may be natural or man-made.

RECORDS SEARCH: The IRP Records Search for Mather Air Force Base, compiled and written by CH2M-Hill.

RESISTIVITY: A factor of the limit to a steady electric current in a conductor that depends upon the material and its physical condition.

RFB: Request for bids.

RPD: Relative percent difference.

RELATIVE PERCENT DIFFERENCE: A measure of the precision of duplicate sample pairs, calculated using the following equation:

$$RPD = \frac{|X_1 - X_2|}{(X_1 + X_2)/2} \times 100\%$$

where X_1 and X_2 are paired duplicate values.

SAC: Strategic air command.

SAND: Particles of sediment having diameters larger than 1/16 mm (62 microns) and smaller than 2 mm.

SANITARY LANDFILL: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes environmental hazards.

SATURATED ZONE: That part of the earth's crust in which all voids are filled with water.

SCS: U.S. Department of Agriculture Soil Conservation Service.

Se: Selenium.

SILT: Sediment particles having diameters larger than 1/512 mm (2 microns) and smaller than 1/16 mm (62 microns).

SLUDGE: The solid residue resulting from a manufacturing or wastewater treatment process that also produces a liquid stream.

$SO_4^{=}$: Sulfate.

SOIL GAS SURVEY: A method of collecting and analyzing volatile organic vapors in the soil to evaluate contamination problems.

SOLID WASTE: Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment, or air pollution control facility and other discarded material, including solid, liquid semisolid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities. This does not include solid or dissolved materials in domestic sewage, solid or dissolved materials in irrigation return flows, industrial discharges that are point sources subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880), or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

SOUTH FORK GRAVELS: A stratigraphic section deposited by the ancestral south fork of the American River, which is comprised of well-rounded pebbles and cobbles in a matrix of iron-cemented sand and clay with areas of hardpan in surface soils.

SOW: Statement of work.

SPECIFIC RETENTION: The ratio of the volume of a liquid that, after being saturated, will retain against the pull of gravity to its own volume. It is stated as a percentage.

SPIKE: A quality control check consisting of a chemical or solution of a known concentration presented to the lab for analysis as an unknown, or the addition of a known quantity of analyte to a sample by the analyst to assess method accuracy.

SPILL: Any unplanned release or discharge of a hazardous substance onto or into the air, land, or water.

SPLIT SAMPLE: A second sample taken from the same site as the original sample to assess sampling and/or laboratory precision; a duplicate sample.

STATIC WATER LEVEL: The elevation of the water table, a surface along which the hydrostatic pressure equals the atmospheric pressure.

STORAGE OF HAZARDOUS WASTE: Containment, either temporarily or for a longer period, in a manner that does not to constitute disposal.

STP: Sewage treatment plant.

STRATIGRAPHY: The science of the description, correlation, and classification of strata in sedimentary rocks, including the interpretation of the depositional environments of those strata.

SWL: Static water level.

1,1,1-TCA: 1,1,1-Trichloroethane.

TCE: Trichloroethene, trichloroethylene.

TOXICITY: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism.

TRACER RESEARCH CORPORATION: Company selected to perform soil gas surveys at Mather Air Force Base.

TREATMENT OF HAZARDOUS WASTE: Any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or render it nonhazardous.

UNCONFORMABLE CONTACT: A transition between strata in which the natural succession has been disturbed or interrupted; unconformity is said to occur as a result of uplift of a formerly subsiding area and its later re-submergence so that younger strata bury the older strata.

UNSATURATED ZONE: Zone above the water table. Most of the time, the pore space between soil particles in this zone is filled with air, except near grain-to-grain boundaries where surface tension maintains a film of water between the particles.

UPGRADIENT: In the direction of increasing hydraulic static head; the direction opposite the prevailing flow of groundwater.

USAF: United States Air Force.

USGS: United States Geological Survey.

VICTOR FORMATION: A stratigraphic section comprised of heterogeneous fluvial clay-to-gravel sediments. It also contains lenticular deposits from banded streams and is mostly made up of silty sand.

VOA: Volatile organic analysis, purgeable fraction of priority pollutants.

VOC: Volatile organic chemical.

VOLATILE COMPOUNDS: Those materials whose vapor pressures are sufficiently high that they may become concentrated in any gaseous phase that forms; readily vaporizable.

WATER TABLE: Surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.

WELL DEVELOPMENT: The process by which a well is swabbed and pumped until the water produced is free of sediment.

WELL SCREEN: The portion of the well casing that is situated in the water-bearing strata and contains .02-inch slits to allow groundwater to enter the well.

APPENDIX B

Scope of Work

Amendment No. 1 to Section C-Description/Specifications

87 Mar 31

INSTALLATION RESTORATION PROGRAM

PHASE II - STAGE 3

MATHER AFB CA *

I. DESCRIPTION OF WORK

This is the follow-on investigation at Mather AFB to evaluate Site No. 7-7100 Disposal Area, Site No. 12-ACW Disposal Site, and Site No. 15-West Ditch Area (see Figure 1). Additional work at the northeast perimeter and water sampling from base wells will also be accomplished. The purpose of this task is to: (1) help determine the magnitude of contamination and the extent of migration of contaminants in the various environmental media; (2) identify potential environmental and health risk consequences of migrating pollutants based upon State or Federal standards for those contaminants; and (3) identify follow-on investigations necessary to determine the magnitude, extent, direction and rate of contaminant migration.

The Phase I IRP Report and Phase II Stage 1 Report (mailed under separate cover) incorporate the background and description of the sites for this task. To accomplish this survey effort, take the following actions:

A. General

1. Monitor the ambient air during all well drilling and test pit work with a photoionization meter or equivalent organic vapor detector to identify the generation of potentially hazardous and/or toxic vapors or gases. Include air monitoring results in the boring logs. If soil encountered during drilling work is suspected to be hazardous because of discoloration, odor or air monitoring, containerize the soil cuttings in new, unused drums. Enter into the boring logs the depth(s) from which suspected contaminated soil cuttings were collected for containerization.

2. Determine the exact field location of all monitor wells during the planning/mobilization phase of the field investigation. Consult with base personnel to minimize disruption of base activities, to properly position wells with respect to exact site locations, and to avoid underground utilities. The senior on-site contract representative, in consultation with the USAFOEHL program manager, establishes the final well locations. The senior on-site contract representative shall direct the drilling and sampling and maintain a detailed log of the conditions and materials penetrated during the course of the work. A registered geologist or professional civil engineer, or a hydrogeologist, shall be responsible for the well drilling and logging.

3. Provide on site analysis of pH, temperature, and specific conductance for all water samples collected. Comply with the following references concerning sample collection, maximum holding time, sample

*Highlight of modification is underscored.

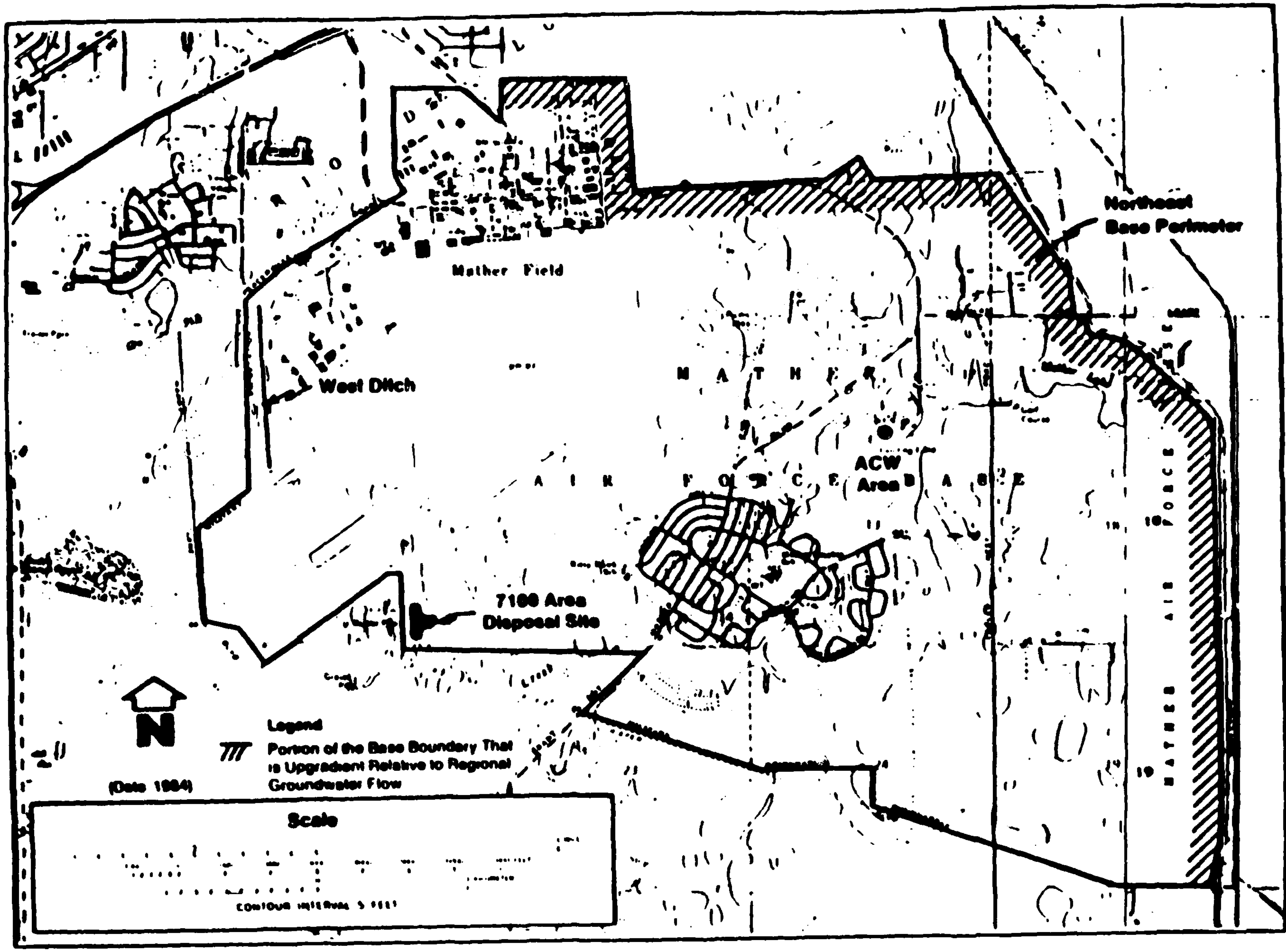


Figure 1. Mather AFB Stage 3 Sites

preservation, etc.: Standard Methods for the Examination of Water and Wastewater, 16 Ed. (1985), pp. 37-44; ASTM, Section 11, Water and Environmental Technology; Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057; and Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pp. xiii to xix (1983). Meet the required detection limits of the applicable EPA method identified in Table 3 for all water and soil chemical analyses.

4. Split all water and soil samples. Analyze one set and immediately deliver the other set (the same collection day) to the field government point of contact (POC). The POC at Mather AFB is the Bioenvironmental Engineer (BEE). The BEE selects 10% of the split samples, packages them for shipment and notifies the contractor they are ready for shipment. Supply all packing and shipping materials for the BEE's use in packaging the split samples. Ensure the split (10%) samples are shipped not later than the day following collection. Forward the samples through overnight delivery to:

USAFOEHL/SA
Bldg 140
Brooks AFB TX 78235-5501

Include the following information with the samples sent to the USAFOEHL:

a. Purpose of sample (analyte)

b. Installation name (Base)

c. Sample number (on container)

d. Source/location of sample

e. Contract Task Numbers and Title of Project

f. Method of collection (bailer,, suction pump, air-lift pump, etc.)

g. Volumes removed before sample taken (water samples only)

h. Special Conditions (use of surrogate standard, etc.)

i. Preservatives used (indicate if nonstandard)

j. Date and time of sampling

k. Sampler's name

Forward this information with each sample by properly completing an AF Form 2752A, "Environmental Sampling Data" and/or AF Form 2752B "Environmental Sampling Data - Trace Organics", working copies of which have

been provided under separate cover. Label each sample container to reflect the data in a, b, c, j and k. In addition, copies of field logs documenting sample collection should accompany the samples.

5. Installation of Groundwater Monitoring Wells

a. Comply with the U.S. EPA Publication 330/9-51-002, NEIC Manual for Groundwater/Subsurface Investigations at Hazard Waste Sites for monitoring well installation.

b. All well drilling, development, purging, sampling methods, and other activity pertaining to this effort must conform to State and other applicable regulatory agency requirements.

c. Install wells at a sufficient depth to collect samples representative of aquifer quality and to intercept contaminants if they are present.

d. Drill and install all monitoring wells using the following specifications:

(1) Drill wells using conventional mud rotary techniques. If drilling fluid additives such as bentonite or polymers are used, ensure their components will not interfere with the chemical analyses to be performed on samples. Biodegradable organic drilling fluid additives are not permitted. Prior to well completion, flush all boreholes constructed with mud rotary equipment with water from the installation drinking water system.

(2) Take lithologic samples at five foot intervals and prepare borehole log descriptions. Include pilot boring logs and well completion summaries in the Final Report (Item VI, below).

(3) Following the completion of each borehole, and before well construction, E-log the borehole. Include E-log data in the Final Report (Item VI below).

(4) Prevent cross contamination between aquifers by using a dual casing system. Where wells extend through the most shallow aquifer and into a deeper aquifer, install an outer conductor casing into the confining layer below the shallow aquifer. Grout the annular space to the surface with bentonite.

(5) Maintain an annular space between the borehole and well casing at three to five inches. Use centralizers to guarantee the casing is centered; install centralizers at the top and bottom of the screened interval and at 40 foot spacing for blank casing.

(6) Construct wells using four inch inside diameter (ID) low carbon steel. Use threaded screw type joints, do not use glue or solvents at the fittings. Screen 20 feet in each well using four inch ID stainless steel

(wire wound) well screen having up to 0.020 inch slots; slot size may be smaller based upon borehole geology. Screen all wells so as to collect floating contaminants and to allow for yearly fluctuation of the water table.

(7) Drill and construct a maximum of 35 wells. Install a five to ten foot blank casing section below the screened interval; cap the bottom of this blank casing. Well installation shall not exceed 6,500 feet.

(8) Shallow wells referenced in this effort define those wells constructed to collect groundwater from the first, most shallow, aquifer. Deep wells are those drilled into the next deeper aquifer, the one below the shallow aquifer. Well clusters consist of both a shallow and a deep well unless specified otherwise in Section B.

(9) Gravel-pack the annulus of each well to a height of five feet above the top of the well screen. Once the casing is installed, remove the drilling bit and allow the soil formation to collapse around the well screen. Supplement the natural gravel pack with washed and bagged rounded sand or gravel having a grain size distribution compatible with the screen and soil formation. Install a three to five foot bentonite 1/4" pellet seal above the gravel pack and an additional three to five foot bentonite 8-20 granular mesh seal above the pellet seal. Ensure the bentonite forms a complete seal. Grout the remainder of the annulus to the surface with the following mixture: five gallons of water with two to five pounds of bentonite per 94 pound bag of cement.

(10) Develop each well as soon as practical after completion by using a combination of a vented surge block and submersible pump. Continue well development until the discharge water is clear and free of sediment to the fullest extent possible, and the pH, temperature and specific conductance have stabilized. Measure the rate of water produced during well development and include this information in the report.

(11) Base officials determine which method is used to complete the well surface:

(a) If well stick-up is of concern in an area, complete the well flush with the land surface. Cut the casing two to three inches below land surface and cement a protective locking lid in place. The protective lid shall consist of a cast iron valve box assembly centered in a three foot diameter concrete pad sloped away from the valve box. Ensure that free drainage is maintained within the valve box. Also, provide a screw-type casing cap to prevent infiltration of surface water. Maintain a minimum of one foot clearance between the casing top and the bottom of the valve box. Clearly mark the well number on the valve box lid.

(b) If an above ground surface completion is used, extend the well casing two or three feet above land surface. Provide an end-plug or casing cap for each well. Shield the extended casing with a steel guard pipe which is placed over the casing and cap, and seated in a four foot by four foot by four inch concrete surface pad. Slope the pad away from the well sleeve. Install a lockable cap or lid at the casing. Install three,

three inch diameter steel guard posts if the base determines the well is in an area which needs such protection. The guard posts shall be six feet in total length and installed radially from each wellhead. Recess the guard post approximately two feet into the ground. Paint the protective steel sleeve and clearly number the well on the sleeve exterior.

(c) Provide locks for both flush and above ground well assemblies. Turn over the lock keys to the base POC following completion of the field effort.

(12) Determine by survey the elevation of all newly installed monitoring wells to an accuracy of 0.01 feet. Horizontally locate the new wells to an accuracy of 1.0 feet and record the position on both project and site specific maps. Bench marks used must have previously been established from and are traceable to a USCGS/USGS survey marker.

(13) Measure water levels at all monitoring wells, including those constructed during Stage 2, as feet below the ground surface, or below the top of casing elevation, to the nearest 0.01 feet. Report elevations in terms of mean sea level. Measure static water levels in wells prior to sampling and well development.

6. Allow wells to stabilize after development for a minimum of 30 days before sampling. Purge wells prior to sampling until a minimum of five well volumes of water have been displaced and the pH, temperature, specific conductance, color, and odor of the discharge have stabilized. Use a submersible pump or bladder pump to purge wells. Sample using a Teflon or stainless steel Kemmerer sampler.

7. If the well(s) cannot be sampled due to well development, well characteristics, or other reason(s), indicate the reason(s) in the report specified in Item VI below.

8. Collect and analyze two rounds of water samples from all groundwater monitoring wells. Collect the initial sample 30 days after well development and the second sample approximately 30 days later. For groundwater monitoring wells installed prior to this effort, but which will be sampled again during this study, also collect two rounds of water samples with approximately 30 days between sample rounds. Collect sample rounds from all wells during the same period (within a two to three day window). During sample collection from all wells, examine the surface of the water table for the presence of hydrocarbons and, if applicable, measure the thickness of the hydrocarbon layer.

9. Chemical Analyses

a. Analyze water and soil samples collected as specified in Section B below, Specific Actions, and summarized in Table 1. The analytical parameters are summarized in Table 3 along with the required methods.

b. Analyses shall meet the required limits of detection for the applicable EPA method identified in Table 3.

c. For those methods which employ gas chromatography (GC) as the analytical technique (E601, SW8010, SW8020, SW8080) positive confirmation of identity is required for all analytes having concentrations higher than the Method Detection Limit (MDL). Conduct positive confirmation by second-column GC; however, gas chromatography/mass spectroscopy (GC/MS) can be used for positive confirmation if the quantity of each analyte to be confirmed is above the detection level of the GC/MS instrument. Analytes which cannot be confirmed will be reported as "Not Detected" in the body of the report, but results of all second-column GC or GC/MS confirmational analyses are to be included in the report appendix along with other raw analytical data. Base the quantification of confirmed analytes upon the first column analysis. The maximum number of second-column confirmational analyses shall not exceed fifty percent (50%) of the actual number of field samples (to include duplicates). The total number of samples for each GC method listed in Table 1 includes this allowance. If GC/MS, or a combination of second-column GC and GC/MS, is used, the total cost of all such analyses for a particular parameter shall not exceed the funding allowed for positive confirmation using only second-column GC.

d. All chemical/physical analyses shall conform to State and other applicable Federal and local regulatory agencies' legal requirements. If a regulatory agency requires that an analysis or analyses be performed in a certified laboratory, assure compliance with the requirement by furnishing documentation showing laboratory certification with the first analytical results to USAFOEHL/TS.

10. For every 10 field samples collected, take one additional sample (a duplicate of the 10) for quality control purposes. Table 1 provides a 10% allowance for these additional analyses. Include all quality control data in the draft final reports. Duplicates shall be indistinguishable from other analytical samples such that personnel performing the analyses should not be able to determine which samples are duplicates.

11. For every 20 field water samples per parameter, prepare and submit one additional field blank for analysis for all parameters in water. Allowances for these additional analyses are included in Table 1.

12. Complete and maintain chain-of-custody records for all samples, field blanks, and quality control duplicates.

13. Plot and map all field data collected for each site according to surveyed positions. Identify or estimate the nature of contamination and the magnitude and potential for contaminant flow within each site to receiving streams and groundwater.

14. Remove all well borehole cuttings and clean the general area following the completion of each well. Properly containerize cuttings suspected of being hazardous waste (based on discoloration, odor, organic vapor detection instrument). Test the suspected hazardous waste for EP Toxicity and Ignitibility. Transport the drums containing suspected contaminated soils to a location on Mather AFB designated by base officials. The base is responsible for ultimate disposal of contaminated soils using base resources; adhere to RCRA guidelines.

15. Decontaminate all sampling equipment prior to use and between samples to avoid cross contamination. Wash equipment with a laboratory-grade detergent followed by clean water, and distilled water rinses. Dedicate a monofilament line or steel wire used to lower samplers for each well; do not use a line in more than one well. The calibrated water level indicator for measuring well volume and fluid elevation must be decontaminated before use in each well.

16. Thoroughly clean and decontaminate the drilling rig and tools before initial use and after each borehole completion. As a minimum, steam clean drill bits after each borehole is installed. Drill from the least to the most contaminated areas, if possible.

17. Conduct a literature search of local hydrogeologic conditions to complement the Phase I and Phase II Reports (mailed under separate cover). Use this data to determine optimum well locations. Include the pertinent literature search information in Appendix D of the Final Report. Develop the literature search data using the following guideline:

a. Topographic data

b. Geologic data

(1) Structure

(2) Stratigraphy

(3) Lithology

c. Hydrologic data

(1) Location of existing and abandoned wells, including observation wells, and springs, natural ponds, and seepages within a one-mile radius of sites to be investigated

(2) Groundwater table and piezometric contours

(3) Depth to groundwater

(4) Surface and groundwater quality

(5) Recharge, discharge and contributing areas

(6) Geologic setting, yield and hydrographs of springs and natural seepages.

d. Data on existing and abandoned wells, to include observation wells, within a one-mile radius of sites to be investigated

(1) Location, depth, diameter, types of wells, and logs

(2) Static and pumping water level, hydrographs, yield,

specific capacity, quality of water

(3) Present and projected groundwater development and use

(4) Corrosion, incrustation, well interference, and similar operation and maintenance problems

(5) Observation well networks

(6) Existing water sampling sites

e. Aquifer data

(1) Type, such as unconfined, artesian, or perched

(2) Thickness, depth, and formational designation

(3) Boundaries

(4) Transmissivity, storativity, and permeability

(5) Specific retention

(6) Discharge and recharge

(7) Ground and surface water relationships

(8) Aquifer models

f. Climatic data

(1) Precipitation (total and net)

(2) Evapotranspiration

B. In addition to the general items delineated in A above, conduct the following specific actions:

1. Site No. 12 - ACW Disposal Site

a. Conduct an intensive file search, review of building plans and aerial photography, and interviews of personnel to narrow the area of search.

b. Perform a combined ground penetrating radar and magnetometer survey over a 25-foot grid to identify conductive or magnetic anomalies in the shallow subsurface. Supplement this effort in suspect areas with a fine grid survey in order to locate the pipe. A maximum of three days is authorized for these geophysical surveys.

c. Conduct a soil gas monitoring program designed to measure the concentration of TCE in the shallow subsurface beneath the site by sampling soil gas at several points in an array and executing in situ analyses for TCE. Develop a contour map of TCE concentrations in soil within a short time

frame to enable the near-surface plume to be more clearly defined. After completing the first "sweep" of soil gas sampling, establish a soil gas monitoring fine grid in the area of highest concentration and repeat the process in this smaller area to further narrow the area of investigation. A maximum of four days is authorized for the soil gas survey.

d. Based upon the information gathered during the geophysical and soil gas surveys, and the Phase II Stage 1 study, drill and install three two-well clusters downgradient (southwest) of the ACW area. Position these well clusters approximately one-half the distance between the ACW site and the family housing area which is to the southwest.

e. Drill and install another two-well cluster upgradient (northeast) of the ACW site to be used for background information.

f. Drill and install one shallow (first aquifer) well northwest of MAFB-1.

g. Drill and install two deep wells, one each in the immediate vicinity of MAFB-1 and MAFB-2. Screen these wells in the same aquifer as the deactivated ACW production well. Install a dual casing system, as needed, to prevent aquifer cross-contamination.

h. Collect two rounds of groundwater samples from the eleven monitor wells installed during this effort and the three existing monitor wells (MAFB-1, MAFB-2 and MAFB-3). Analyze the samples for common ions and minerals, and VOA compounds; see Table 1.

2. Site No. 7 - 7100 Disposal Area

a. Conduct an electromagnetic survey of the ground surface downgradient from the landfill. This necessitates off-base survey work. Conduct the survey at three separate spacings to provide vertical and lateral definition for subsurface conductivity. Based upon the difference in specific conductance, attempt to track the plume of mineralized groundwater emanating from the landfill area.

b. Conduct a soil gas monitoring program designed to measure the concentration of TCE in the shallow subsurface beneath the site by sampling soil gas at several points in an array and executing in situ analyses for TCE. Develop a contour map of TCE concentrations in soil within a short time frame to enable the near-surface plume to be more clearly defined. After completing the first "sweep" of soil gas sampling, establish a soil gas monitoring fine grid in the area of highest concentration and repeat the process in this smaller area to further narrow the area of investigation. A maximum of one day is authorized for the soil gas survey.

c. Drill and install four two-well clusters downgradient of the site. Position the wells as follows:

(1) One well cluster southwest of the JTC well and adjacent to, but inside, the installation boundary.

(2) Three well clusters downgradient of the currently installed monitor wells (MAFB-7, MAFB-8 and MAFB-9); these well clusters will be outside the installation boundary.

d. Drill and install one deep well in the immediate vicinity of MAFB-8.

e. Drill and install three shallow wells (first aquifer) and position them as follows:

(1) One well directly between the existing Fire Department Training Area (FDTA) Site 11 and the 7100 Area.

(2) One well upgradient of the 7100 Area, and between the 7100 Area and the abandoned Sewage Treatment Plant (STP) oxidation ponds.

(3) One well upgradient of the STP oxidation ponds.

f. Collect two rounds of groundwater samples from the 12 monitor wells installed during this effort and the three existing monitor wells (MAFB-7, MAFB-8 and MAFB-9). Analyze all samples for common ions and minerals, VOA compounds, metals and cyanids. Also analyze samples from the well between the landfill and FDTA for petroleum hydrocarbons and phenol.

3. Site No. 15 - West Ditch Area

a. Drill and install two two-well clusters, positioned as follows:

(1) One well cluster directly west of the oil skimmer, adjacent to and inside the installation boundary.

(2) One well cluster directly north of MAFB-10, adjacent to and inside the installation boundary where the perimeter fence meets Old Placerville Road.

b. Drill and install two deep wells (second aquifer), one each in immediate vicinity of existing monitor wells MAFB-10 and MAFB-11.

c. Drill and install one shallow well in the immediate vicinity of the Base Commissary (Bldg No. 1200).

d. Collect two rounds of groundwater samples from the seven monitor wells installed during this effort and the two existing monitor wells (MAFB-10 and MAFB-11). Analyze all samples for VOA compounds, and common ions and minerals.

4. Northeast Perimeter

a. Drill and install three deep wells (second aquifer) in the immediate vicinity of MAFB-4, MAFB-5 and MAFB-6.

b. Drill and construct one shallow monitoring well (first aquifer) near existing well MAFB-4.

c. Drill and construct one shallow monitoring well (first aquifer) near existing well MAFB-6.

d. Collect two rounds of groundwater samples from the five monitor wells installed during this effort and the existing monitor well MAFB-5A. Analyze all samples for VOA compounds, and common ions and minerals.

5. Base Wells

Collect one round of water samples from 8 base wells. Analyze all samples for VOA compounds, and common ions and minerals.

C. Field Coordination

1. Notify the Mather AFB POC at least one week in advance of any work to be accomplished outside of the installation boundary.

2. Notify the USAFOEHL and Mather AFB POCs at least five days in advance of water sample collection dates.

D. Technical Operations Plan

Within two (2) weeks after the Notice to Proceed for the delivery order, submit a Technical Operations Plan (TOP) based on the technical requirements specified in this task description for the proposed effort. (See Sequence No. 19, Item VI below). Follow the TOP format (mailed under separate cover).

E. Health and Safety

Comply with all applicable USAF, OSHA, EPA, State and local health and safety regulations regarding the proposed work effort. Use EPA guidelines for designating the appropriate levels of personal protection needed at the study sites. Prepare a written Health and Safety Plan for the proposed work effort and coordinate it directly with regulatory agencies prior to commencing field operations. Provide an information copy of the Health and Safety Plan to the USAFOEHL after coordination with regulatory agencies. The Health and Safety Plan is specified in Sequence No. 7, Item VI below.

F. Data Review

1. Tabulate field and analytical laboratory results, including field and laboratory parameters and QA/QC data, as they become available and incorporate them into the next monthly R&D Status Report (Sequence No. 1, Item

IV below) forwarded to the USAFOEHL. In addition to the results, report the following:

a. the time and dates of sample collection, extraction (if applicable) and analysis;

b. the method used and Method Detection Limits achieved;

c. the Chain-of-Custody forms;

d. a cross-reference of laboratory sample numbers and field sample numbers; and

e. a cross-reference of field sample numbers to wells, boreholes, sites, etc.

2. Upon completion of all analyses, tabulate and incorporate all results into an Informal Technical Information Report (Sequence No. 3, Item VI below) and forward the report to USAFOEHL for review a minimum of two weeks prior to submission of the draft report. Provide as a minimum the information specified in I.F.1 above.

3. Immediately report to the USAFOEHL Program Manager or his supervisor via telephone, data/results generated during this investigation which indicate a potential health risk (for example, a contaminated drinking water aquifer). Follow the telephone notification with a written notice and laboratory raw data (e.g. chromatogram) within three days.

G. Reporting

1. Prepare a draft report delineating all findings of this field investigation and forward it to the USAFOEHL (as specified in Sequence No. 4, Item VI below) for Air Force review and comment. Strictly adhere to the USAFOEHL report format (mailed under separate cover). Draft reports are considered "drafts" only in the sense that they have not been reviewed and approved by Air Force officials. In all other respects, "drafts" must be complete, in the proper format, and free of grammatical and typographical errors. Include a discussion of the regional/site specific hydrogeology, well and boring logs, data from water level surveys, groundwater surface and gradient maps, water quality and soil analysis results, soil gas data, available geohydrologic cross sections, and laboratory and field QA/QC information. Use all available Phase II information from Stages 1, 2, and 3. Follow the USAFOEHL supplied format (mailed under separate cover). The format is an integral part of this delivery order. For States requiring the field work or technical effort be supervised by a State registered geologist, engineering geologist or professional engineer, insert information in the report to include registration numbers, certificates and seals (as appropriate).

2. Review the results, conclusions and recommendations concerning the sites listed in this task which were investigated during a previous IRP Phase II staged work effort. Use this information and data from previous efforts to establish trends and develop conclusions and recommendations. Integrate all

investigative work done at each site to date so the report reflects the total cumulative information for each site studied in this effort.

3. In the Results Section, include water and soil analyses results and field quality control sample data. Internal laboratory quality control data (lab blanks, lab spikes and lab duplicates), and laboratory quality assurance information should be in Appendix H. Provide second column confirmation results and include which columns were used, instrument operating conditions and retention times. Summarize in the Appendix the specific collection technique, analytical method, holding time, and limit of detection for each analyte (Standard Method, EPA, etc.).

4. Make estimates of the magnitude, extent and direction which detected contaminants are moving. Identify potential environmental consequences of discovered contamination, where known, based upon State or Federal standards.

5. In the Recommendation Section, address each site and list them by category:

a. Category I consists of sites where no further action (including remedial action) is required. Data for these sites are considered sufficient to rule out unacceptable public health or environmental hazards.

b. Category II sites are those requiring an additional Phase II effort to determine the direction, magnitude, rate of movement and extent of detected contaminants. Identify potential environmental consequences of discovered contamination, where known.

c. Category III sites are those that will require remedial action (ready for IRP Phase IV). In the recommendations for Category III sites, include any possible influence on sites in Categories I and/or II due to their connection with the same hydrological system. Clearly state any dependency between sites in different categories. Include a list of candidate remedial action alternatives, including Long Term Monitoring (LTM) as remedial action, and the corresponding rationale that should be considered in selecting the remedial action for a given site. List all alternatives that could potentially bring the site into compliance with environmental standards. For contaminants that do not have standards, EPA recommended safe levels for noncarcinogens (Health Advisory or Suggested-No-Adverse-Response Levels) and target levels for carcinogens (1×10^{-6} cancer risk level) may be used. Unless specifically requested, do not perform any cost analyses, or cost/benefit review for remedial action alternatives. However, in those situations where field survey data indicate immediate corrective action is necessary, present specific, detailed recommendations.

For each category above, summarize the results of field data, environmental or regulatory criteria, or other pertinent information supporting conclusions and recommendations. Put this summary information into a table and insert the table(s) into the text and the Executive Summary.

6. Provide cost estimates by line item for future efforts recommended for Category II sites and LTM Category III sites. Submit these estimates

concurrently with the approved final technical report in a separate document. Only the cost requirement outlined in Sequence No. 2, Item VI, need be submitted.

a. For Category II sites, develop detailed site-specific estimates using prioritized costing format (i.e., cost of conducting the required work on: the highest priority site only; the first two highest priority sites only; the first three highest priority sites only; etc., until all required work is discretely costed) for the proposed work effort. The Air Force determines the priority of sites from contractor recommendations. Consider the type of contaminants, their magnitude, the direction and rate of their migration, and their subsequent potential for environmental and health consequences when developing recommendations for site prioritization.

b. For Category III sites slated for long-term monitoring, develop site-specific estimates which detail the cost associated with: (1) permanent installation of monitoring wells; (2) groundwater sampling interface equipment, including permanent installation of pumps and sampling lines; and (3) four quarterly (1 year period) sample collections and laboratory chemical analyses of groundwater, etc.

7. Provide an inventory of all on-base wells, to include production, irrigation, monitoring, etc. If the well has been abandoned, note the reason.

8. Reference in an appendix any local, State and/or Federal regulations which require specific well drilling techniques, materials, well development, purging, and sampling methods.

H. Meetings

The contractors project leader shall attend three meetings to take place at a time to be specified by the USAFOEHL. Each meeting shall take place at Mather AFB for a duration of one day (eight hours).

I. Applications and Permits

Complete the "Application and Water Well Job Permit," and the "Application for Encroachment Permit" and all other forms and permits necessary for the installation of wells outside of the installation boundary. File all forms with appropriate agencies.

II. SITE LOCATION AND DATES

Mather AFB CA
Dates to be established

III. BASE SUPPORT

A. Prior to any contractor digging or drilling, locate underground utilities and issue digging permits.

B. Store and dispose of contaminated drill cuttings.

C. Obtain easements for performing a geophysical survey, and drilling and constructing monitor wells downgradient of the 7100 Area Disposal Site (Site 7).

D. Provide the contractor with existing engineering plans, drawings, diagrams, aerial photographs, etc., as needed to evaluate sites under investigation.

E. The base BEE selects 10% of the split samples provided by the contractor, packages them, and ensures they are picked up by the contractor within 24 hours of sample receipt by the POC. See paragraph 1.A.4.

IV. GOVERNMENT FURNISHED PROPERTY: None

V. GOVERNMENT POINTS OF CONTACT:

1. Capt David P. Gibson, Jr.
USAFOEHL/TX
Brooks AFB TX 78235-5501
(512) 536-2158
AV 240-2158
1-800-821-4528

2. Capt James P. Curran
USAF Hospital Mather/SGPB
Mather AFB CA 95655-5000
(916) 364-2284
AV 828-2284

3. Lt Col Ronald Schiller
Hq ATC/SGPB
Randolph AFB TX 78150-5001
(512) 652-5271
AV 487-5271

4. MSgt Patricia A. Sparks
USAF Hospital Mather/SGPB
Mather AFB CA 95655-5000
(916) 364-2284
AV 828-2284

VI. In addition to sequence numbers 1, 5, and 11 listed in Attachment 1 to the contract, and which apply to all orders, the sequence numbers listed below are applicable to this order. Also shown are dates applicable to this order.

Sequence No.	Para No.	Block 10	Block 11	Block 12	Block 13	Block 14
19 (TOP)*	I.D.	OTIME	86 Jul 30	86 Aug 15		15
7 (Health & Safety)	I.E.	OTIME	86 Jul 30	86 Aug 15		3
3 (Prelim Data)	I.F.2	OTIME	***	***		3
4 (Tech Rpt)	I.G.	ONE/R	86 Nov 15	86 Nov 28	87 Jun 30	**
14		MONTHLY	86 Aug 15	86 Aug 15	****	3
15		MONTHLY	86 Aug 15	86 Aug 15	****	3
2 (Cost Data)	I.G.6	OTIME	87 Mar 02	87 Jun 30	--	*****

*The Technical Operations Plan (TOP) is due within 2 weeks of the Notice to Proceed.

**Two draft reports (25 copies of each) and one final report (50 copies plus the original camera ready copy) are required. Incorporate Air Force comments into the second draft and final reports as specified by the USAFOEHL. Supply the USAFOEHL with a final copy of the first draft, second draft, and final reports for acceptance prior to distribution. Distribute the remaining 24 copies of each draft report and 49 copies of the final report as specified by the USAFOEHL.

***Upon completion of the total analytical effort and before submission of the first draft report.

****Submit monthly thereafter.

*****Submit cost estimates in a separately bound document for Category II and Category III, Long Term Monitoring, sites. Provide this document (five copies) with the Final Report only.

TABLE 1

SAMPLING AND ANALYTICAL REQUIREMENTS
MATHER AFB

Analyte	Medium	Sites: 12 (ACW)	7 (7100)	15 (W. Ditch)	Northeast Perimeter	Production Wells	QA[5]	2nd Column[6] Confirmation	Total
VOA[1]	Water	28	30	18	12	8	15	56	167
Petroleum Hydrocarbons	Water	0	2	0	0	0	2	NA	4
Phenol	Water	0	2	0	0	0	2	NA	4
Common Ions[2] and Minerals[3]	Water	28	30	18	12	8	15	NA	111
Metals[4]	Water	0	30	0	0	0	5	NA	35
Cyanide	Water	0	30	0	0	0	5	NA	35

NOTES: [1]See Table 2

[2]Chloride, sulfate, nitrate, bromide, fluoride, nitrite and phosphate

[3]Bicarbonate, carbonate and hydroxide alkalinity, calcium, magnesium, iron, manganese, sodium, total dissolved solids and total hardness

[4]Arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver

[5]QA is 10% of the basic sample load plus a field blank for every 20 water samples per parameter

[6]Assumes 50% of Method E601, SW8010, SW8020 and SW8080 samples will require a second column confirmation

TABLE 2

VOLATILE ORGANIC AND AROMATIC COMPOUNDS (VOA)

Purgeable Halocarbons EPA Methods 601 and 8010	Purgeable Aromatics EPA Method 8020
Bromodichloromethane	Benzene
Bromoform	Chlorobenzene
Bromomethane	1,2-Dichlorobenzene
Carbon tetrachloride	1,3-Dichlorobenzene
Chlorobenzene	1,4-Dichlorobenzene
Chloroethane	Ethylbenzene
2-Chloroethylvinyl ether	Toluene
Chloroform	
Chloromethane	
Dibromochloromethane	
1,2-Dichlorobenzene	
1,3-Dichlorobenzene	
1,4-Dichlorobenzene	
Dichlorodifluoromethane	
1,1-Dichloroethane	
1,2-Dichloroethane	
1,1-Dichloroethene	
trans-1,2-Dichloroethene	
1,2-Dichloropropane	
cis-1,3-Dichloropropene	
trans-1,3-Dichloropropene	
Methylene chloride	
1,1,2,2-Tetrachloroethane	
Tetrachloroethylene	
1,1,1-Trichloroethane	
1,1,2-Trichloroethane	
Trichloroethylene	
Trichlorofluoromethane	
Vinyl Chloride	

TABLE 3

Analytical Parameters, Methods, and Required Detection Limits

Parameter	Method	Detection Limit
Petroleum Hydrocarbons - water (IR analysis)	E418.1	1 mg/L
PCB - Soil	SW3550/SW8080	1 mg/Kg
Aromatic volatile organics - water	SW8020	a
Aromatic volatile organics - soil	SW5030/SW8020	a
Halogenated volatile organics - water	E601	a
Halogenated volatile organics - soil	SW5030/SW8010	a
Phenol - water	E420.1	5 µg/L
Common Anions - water	A429	0.1 mg/L
Metals and Minerals - water	E200.7	
barium		0.002 mg/L
cadmium		0.004 mg/L
calcium		0.010 mg/L
chromium		0.007 mg/L
iron		0.007 mg/L
lead		0.042 mg/L
magnesium		0.030 mg/L
manganese		0.002 mg/L
silver		0.007 mg/L
sodium		0.029 mg/L
Arsenic - water	E206.2	0.001 mg/L
Mercury - water	E245.1	0.0002 mg/L
Selenium - water	E270.2	0.002 mg/L
Total dissolved solids - water	E160.1	10 mg/L
Total carbonate alkalinity - water	A403	-
Bicarbonate alkalinity - water	A403	-
Hydroxide alkalinity - water	A403	-

Specific conductance - water (field test)	E120.1	-
pH (field test) - water	E150.1	-
Temperature (field test) - water	E170.1	-

[a]Detection limit as specified by the applicable EPA or Standard Method

[b]

Metal	mg/ℓ of Leaching Solution
As	0.002
Ba	0.1
Cd	0.005
Cr	0.05
Hexavalent Cr	0.05
Pb	0.1
Hg	0.0002
Se	0.002
Ag	0.01

[c]Find if sample is ignitible at 140 degrees Fahrenheit or below. If so, it is a hazardous waste, in accordance with 40 CFR 261.21.

Additional Notes:

1. VOA refers to analysis for both Aromatic Volatile Organics and Halogenated Volatile Organics.

2. "A" Methods - Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985).

3. "E" Methods - U.S. Environmental Protection Agency

4. "SW" Methods - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Edition (USEPA, 1984)

5. For soil samples, report results as mg/Kg of dry soil. Report moisture content for each soil sample.

APPENDIX C

Sample Numbering System

C. SAMPLE NUMBERING SYSTEM

All groundwater samples collected from Mather AFB for laboratory analysis were given a six-digit code for rapid identification. The first four digits indicate the monitoring well from which the sample was collected. For example, DH-12-XX represents a sample taken from Well No. 12. DH stands for drill hole and always preceeds the well number. The thirty-five wells installed during Phase II Stage 3 range from DH-40 to DH-73 and DH-75 (Stage 1 wells were DH-1 to DH-11 and Stage 2 wells were DH-12 to DH-39 and DH-75). Base production wells are coded according to the system already established by base personnel (MB-2, HW-3, K-9, etc.)

The last two digits of the groundwater sample numbering code represent the chronological order in which a sample was taken for a specific set of parameters. Thus DH-25-G1 represents the first set of groundwater samples taken from Well 25. The last two digits take into account previous samples collected from Phase II Stage 1 wells.

AV quality assurance (QA) samples are numbered using the six-digit codes described above and are "blind" QA samples. This minimizes the possibility of prejudicial treatment being given to QA samples in the laboratory.

All QA samples (splits) sent to the Air Force OEHL are numbered according to the Air Force sample-numbering system outlined in Air Force Form 2752. Table C-1 correlates AV's sample codes with the USAF sample numbers, which were logged for samples sent to the OHEL laboratory.

TABLE C-1

AV Sample No.	Air Force Sample No.
DH-68-G1	GN-86-0390
DH-51-G1	GN-86-0391
DH-42-G1	GN-86-0400
DH-10-G1	GN-86-0401
DH-57-G2	GN-86-0455
DH-44-G2	GN-86-0456
DH-43-G2	GN-86-0457

APPENDIX D

Schematic Logs of Wells

(includes boring log for Well No. 75 which was drilled as part of Stage 2)

Well No. MAFB-40

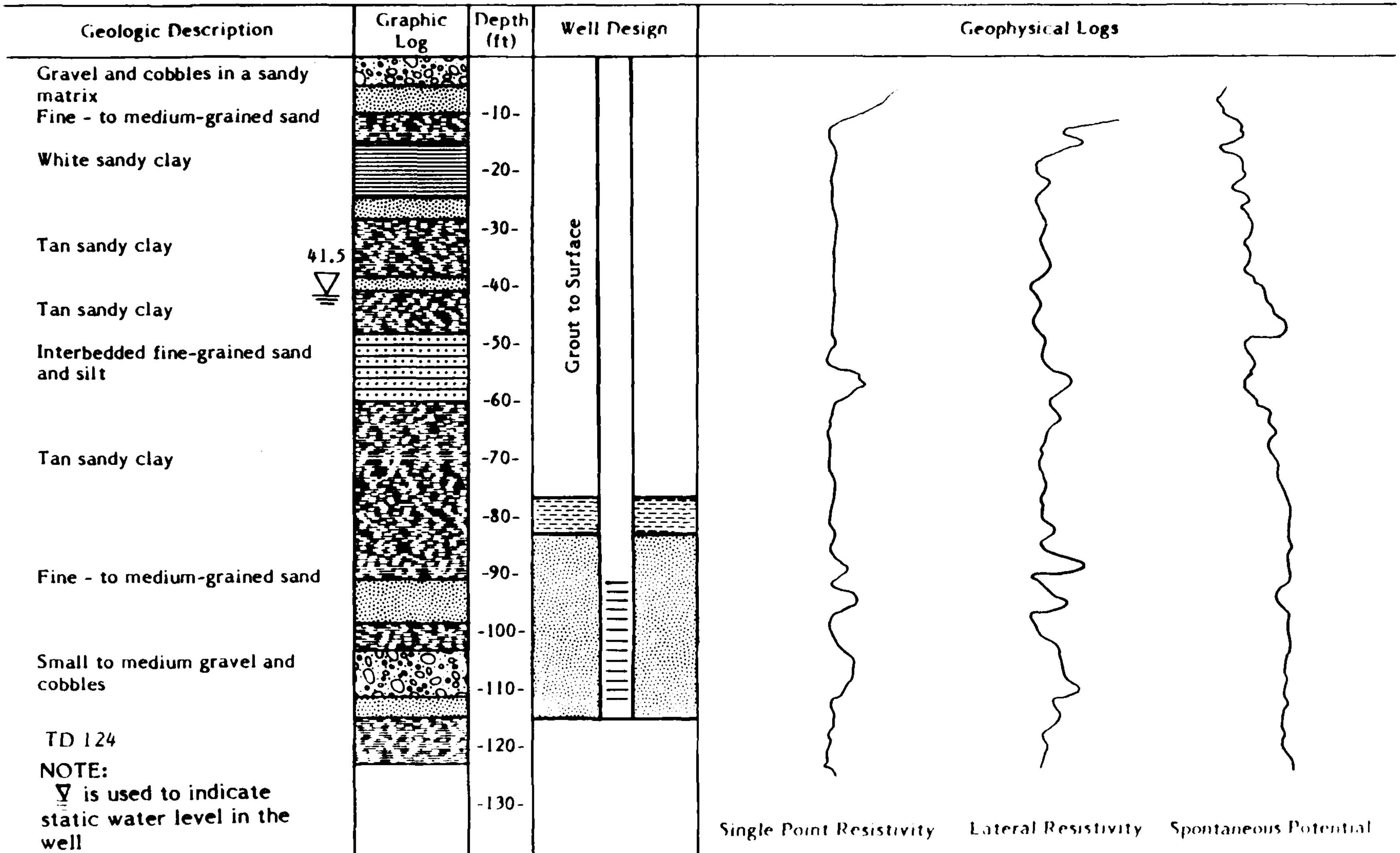
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By O'Gara

Checked By Napp

Date 9/16/86



AV F HW05

Well No. MAFB-41

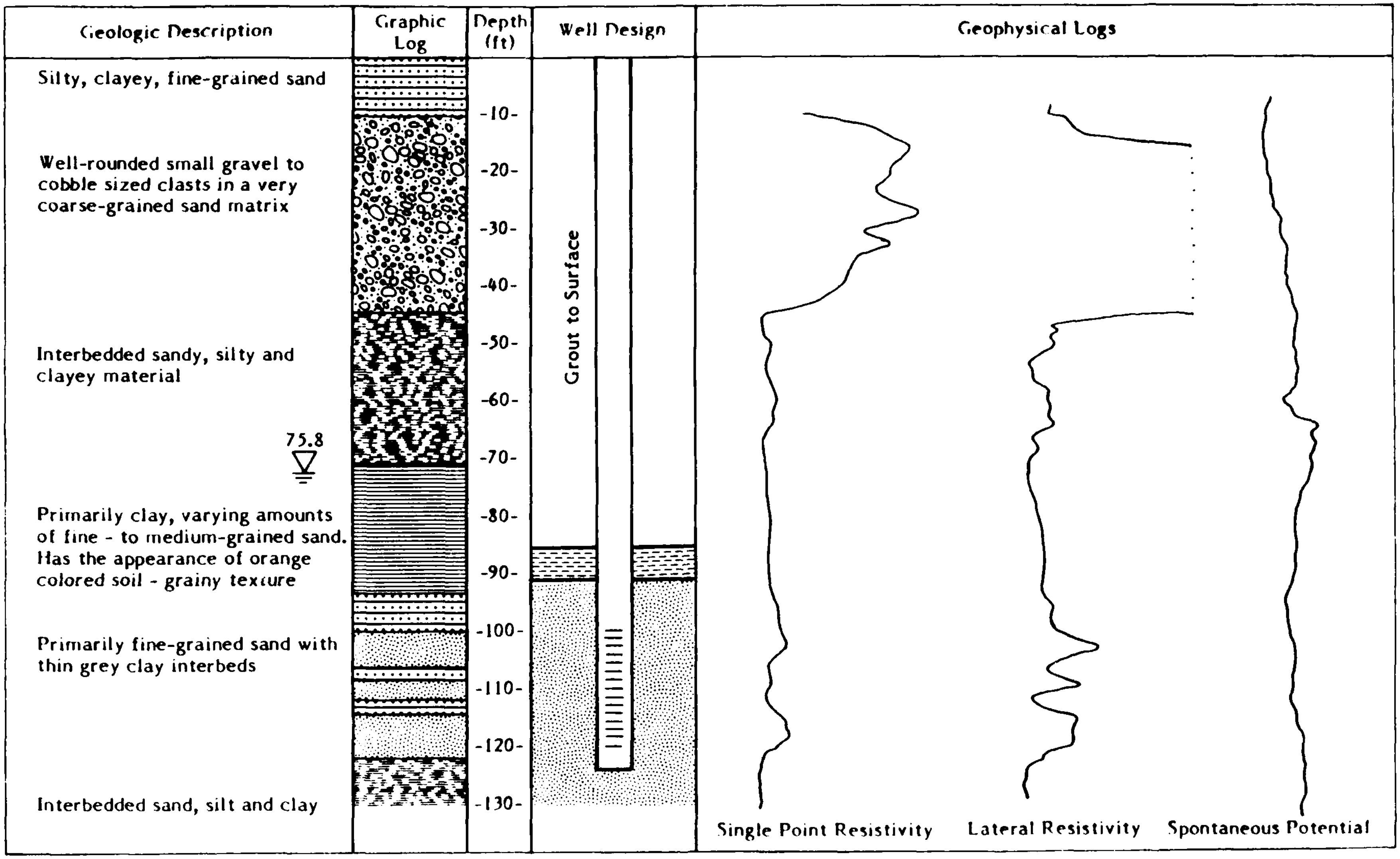
Logged By O'Gara

Checked By Napp

Date 9/18/86

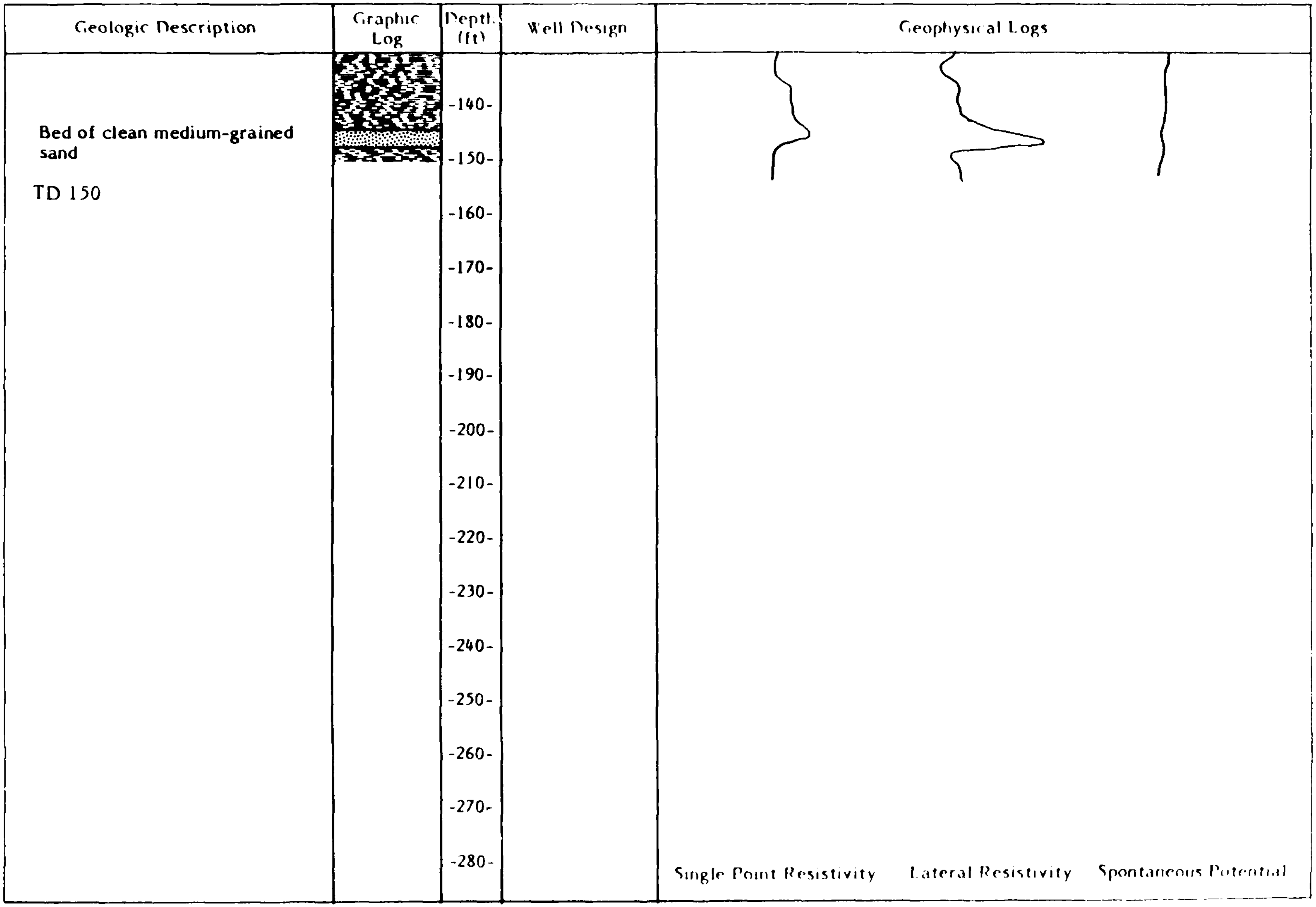
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary



AV-F-HW05

MAFB-41


Geologic Description
Graphic Log
Depth (ft)
Well Design
Geophysical Logs
Bed of clean medium-grained sand
TD 150
-140-
-150-
-160-
-170-
-180-
-190-
-200-
-210-
-220-
-230-
-240-
-250-
-260-
-270-
-280-
Single Point Resistivity
Lateral Resistivity
Spontaneous Potential

Well No. MAFB-42

Logged By Napp

Checked By O'Gara

Date 9/19/86

Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Geologic Description

Interbedded very fine-grained sand, silt and clay; interbeds are 1 or 2 feet thick

Clast size ranges from cobble to pea gravel in a matrix of very coarse-grained sand

Silt with fine-grained sand and minor clay

Very fine-grained silty sand

78.9

A thick interval of reddish-brown silt

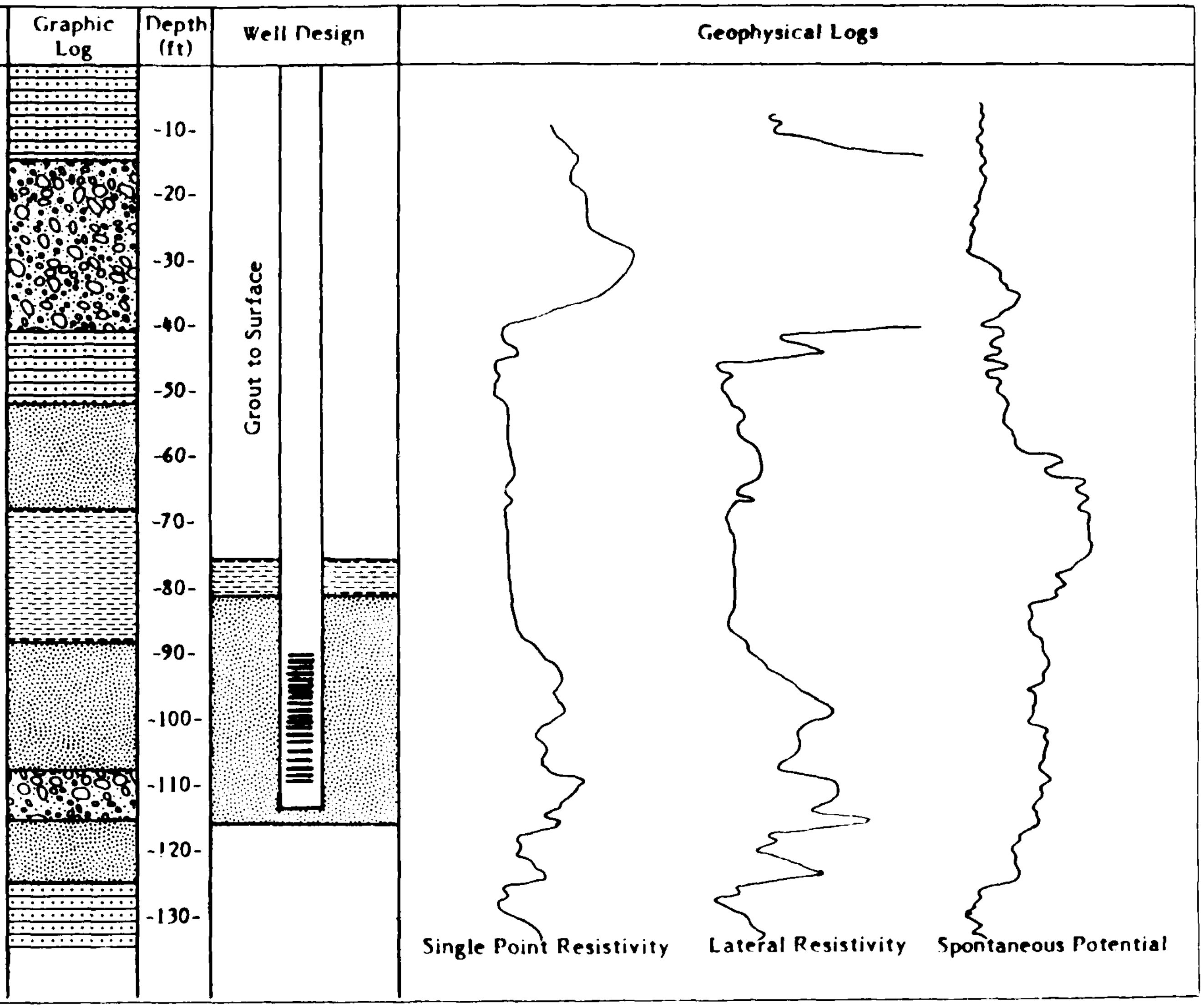
Medium - to coarse-grained sand

Interbedded medium - to coarse-grained sand and pea gravel

Fine-grained silty sand

TD 133

AV-F-HW05



Well No. MAFB-43

Logged By O'Gara/Napp

Checked By Napp

Date 8-15-86

Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Geologic Description	Graphic Log	Depth (ft)	Well Design	Geophysical Logs

Well-rounded gravel and cobbles up to 8" in diameter

Primarily brown clay with many stringers of silt, sand and a few pebbles

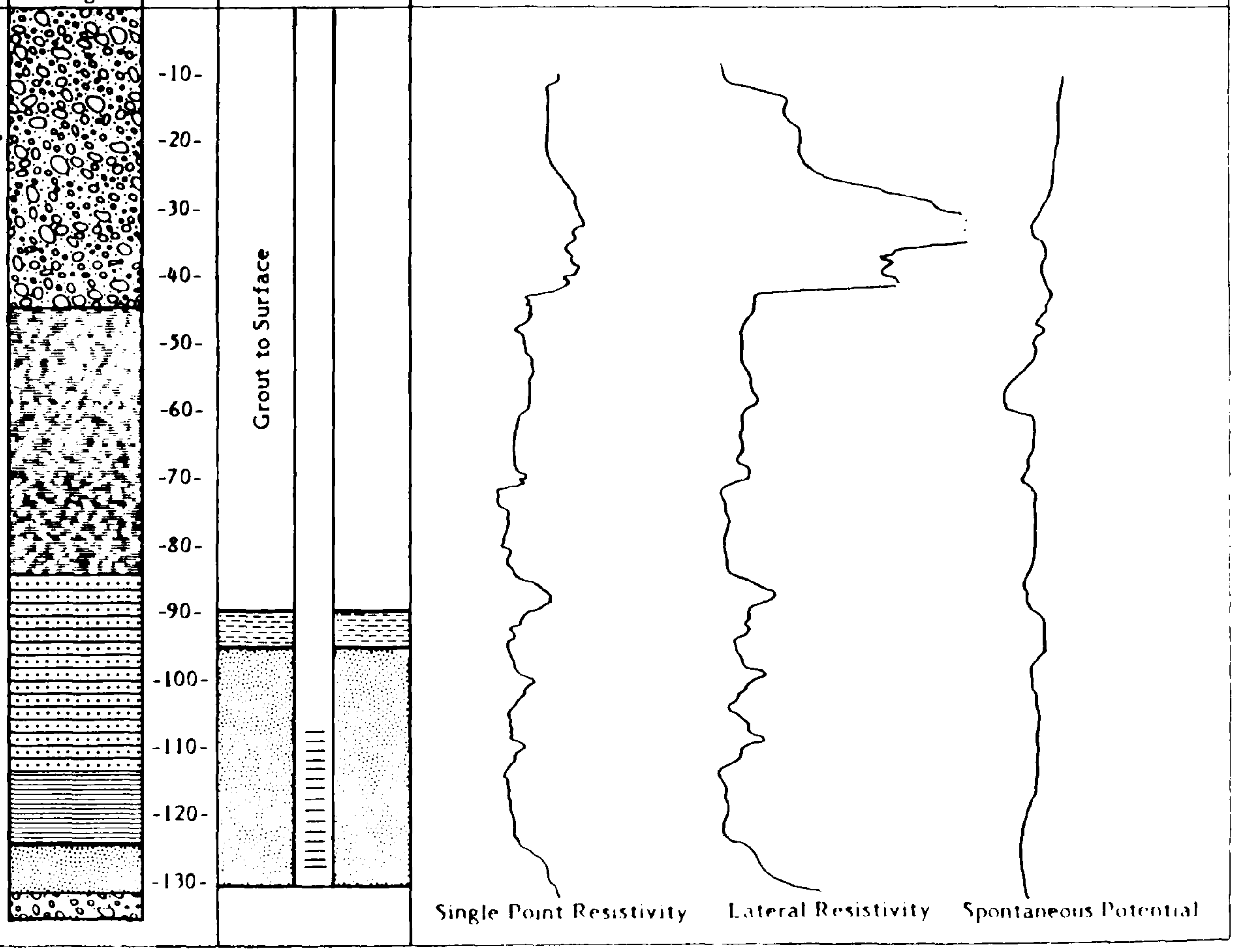
76.5

Same as above with an increase in sand content

Brown sticky clay

Small - to medium-sized gravel in a coarse-grained sand matrix

TD 133



AV-F-HW05

Well No. MAFB-44

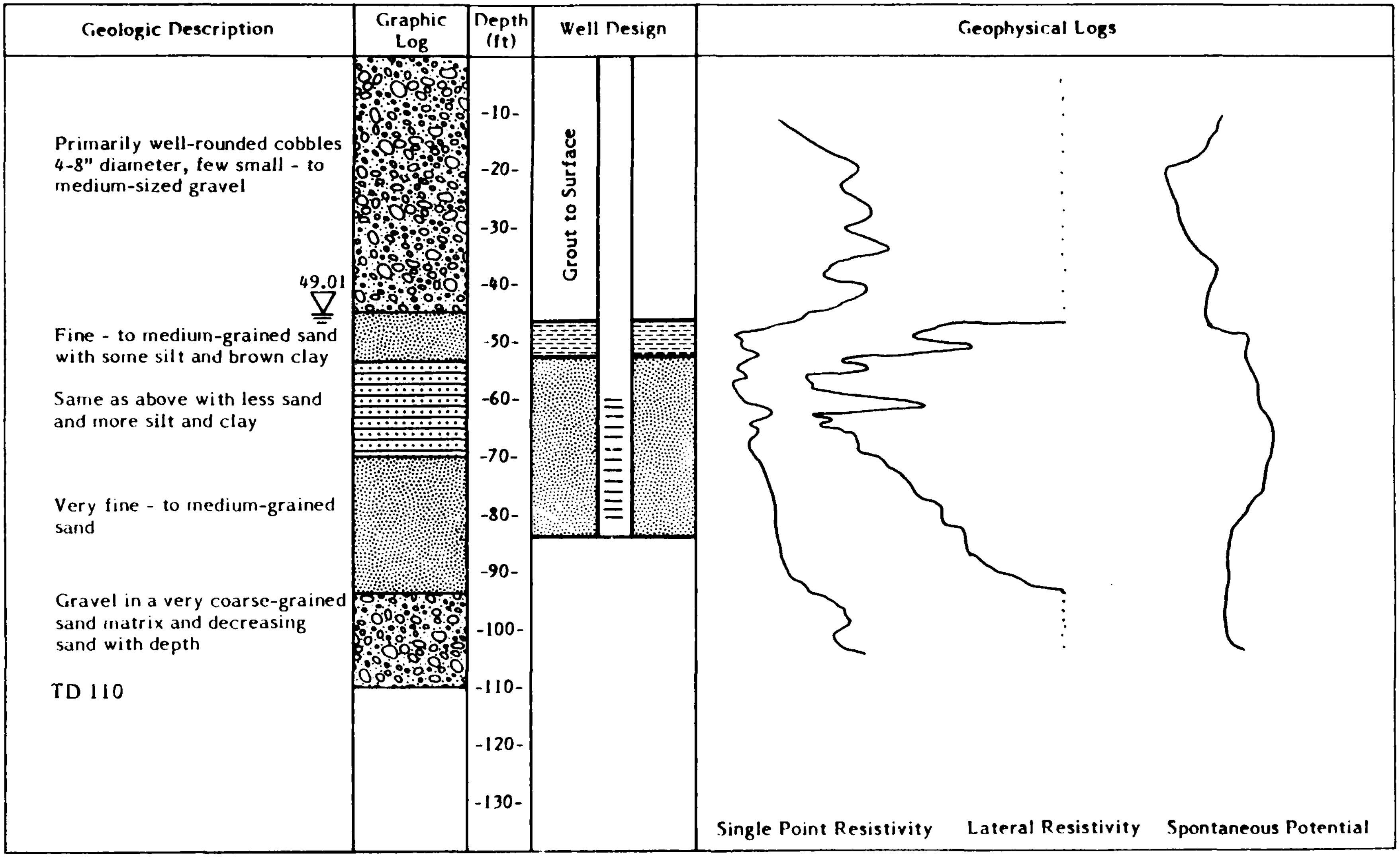
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

Checked By O'Gara

Date 8/19/86



AV-F-HW05

Well No. MAFB-45

Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Amber

Checked By Napp/O'Gara

Date 8/21/86

Geologic Description

Small to medium gravels in a matrix of coarse sand

Gravel with minor sand in a matrix of medium-gravels to coarse-grained sand

52.2

Fine - to medium-grained sandy silt with minor clay

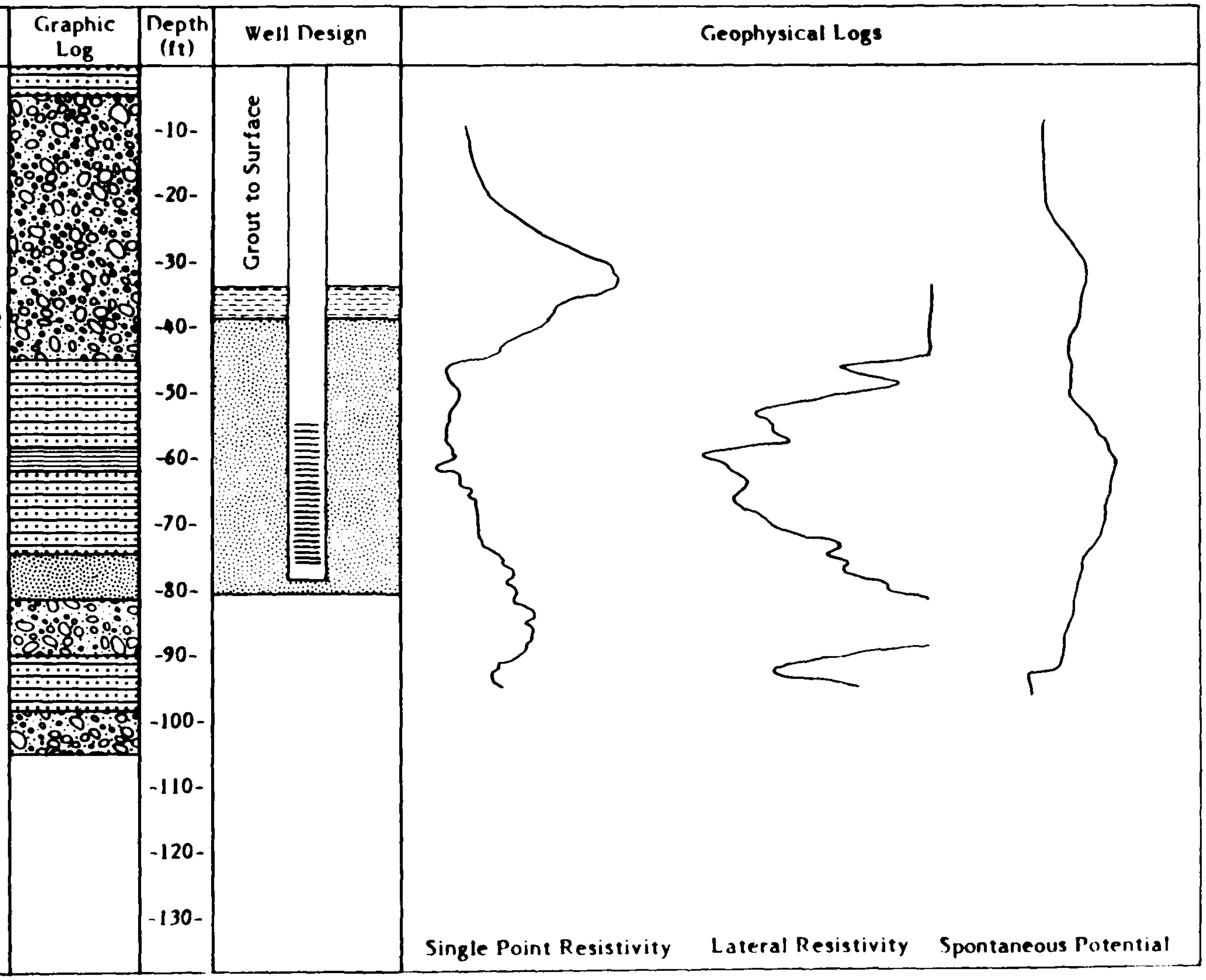
Interbedded sand, silt and a few clay stringers

Fine - to medium-grained sand

Small to medium-sized gravel

Gravel and cobbles

TD 105



AV-F-HW05

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Well No. MAFB-46

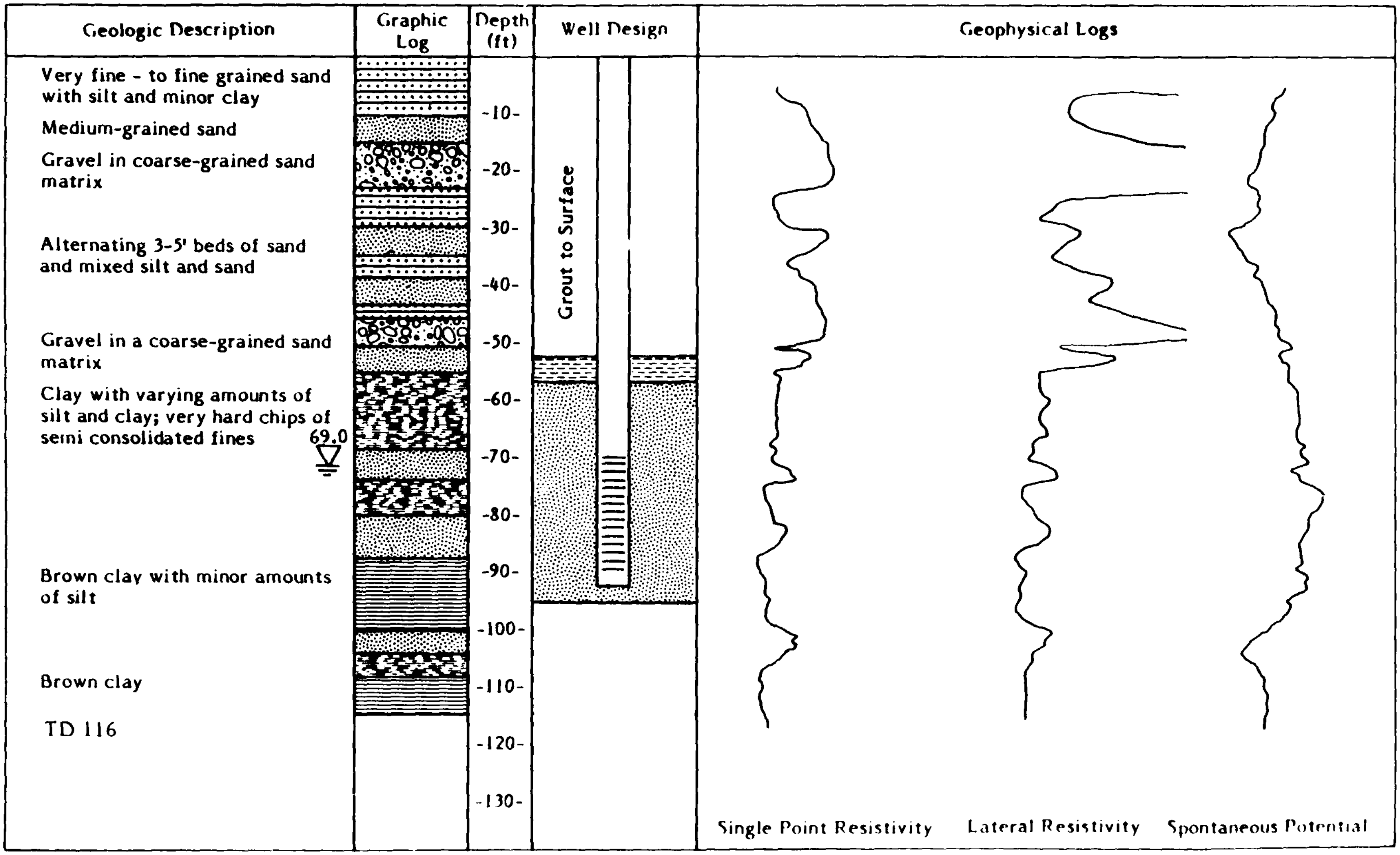
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

Checked By O'Gara

Date 9/21/86



AV-F-HW05

Well No. MAFB-47

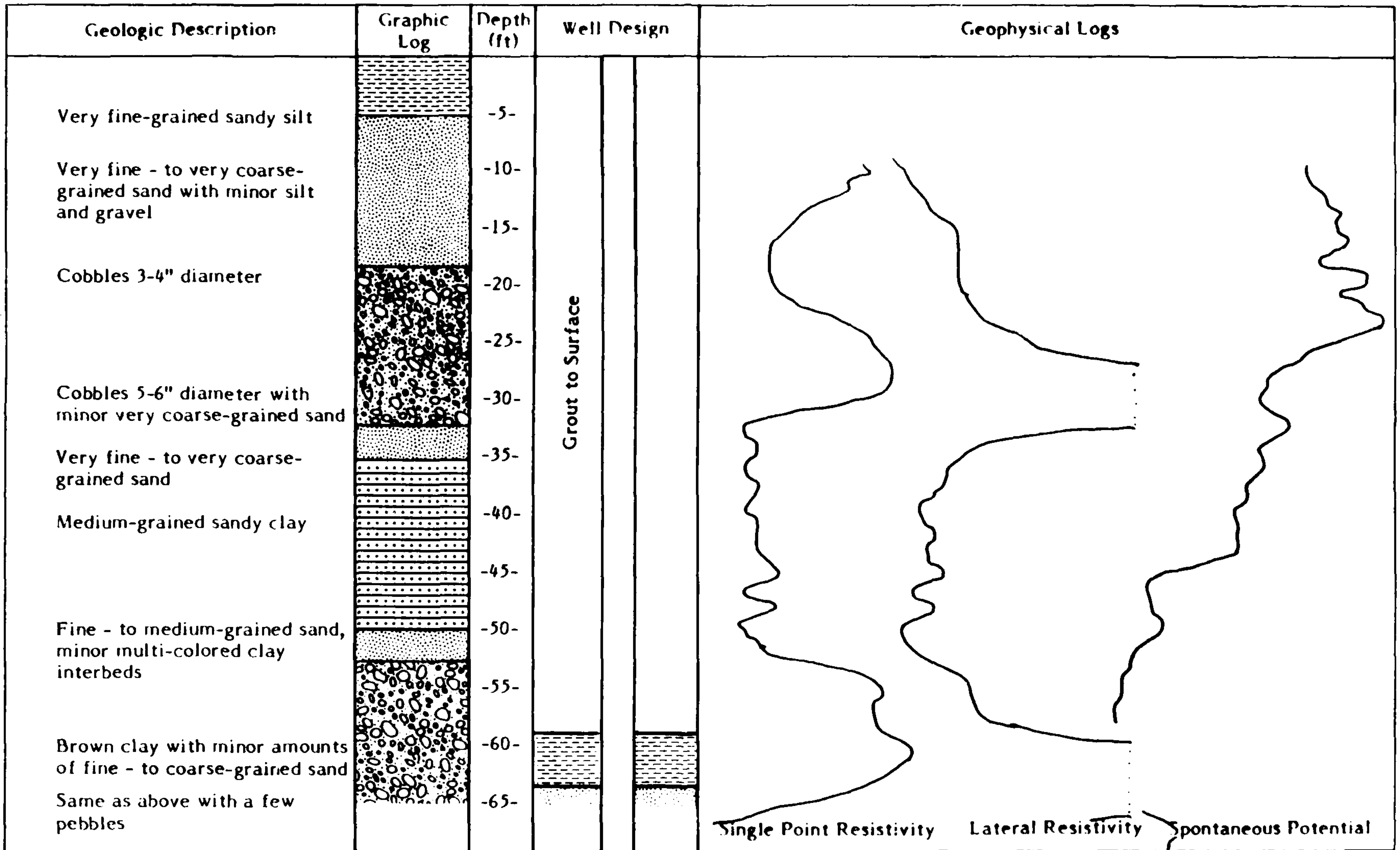
Logged By Amber

Checked By Napp

Date 8/23/86

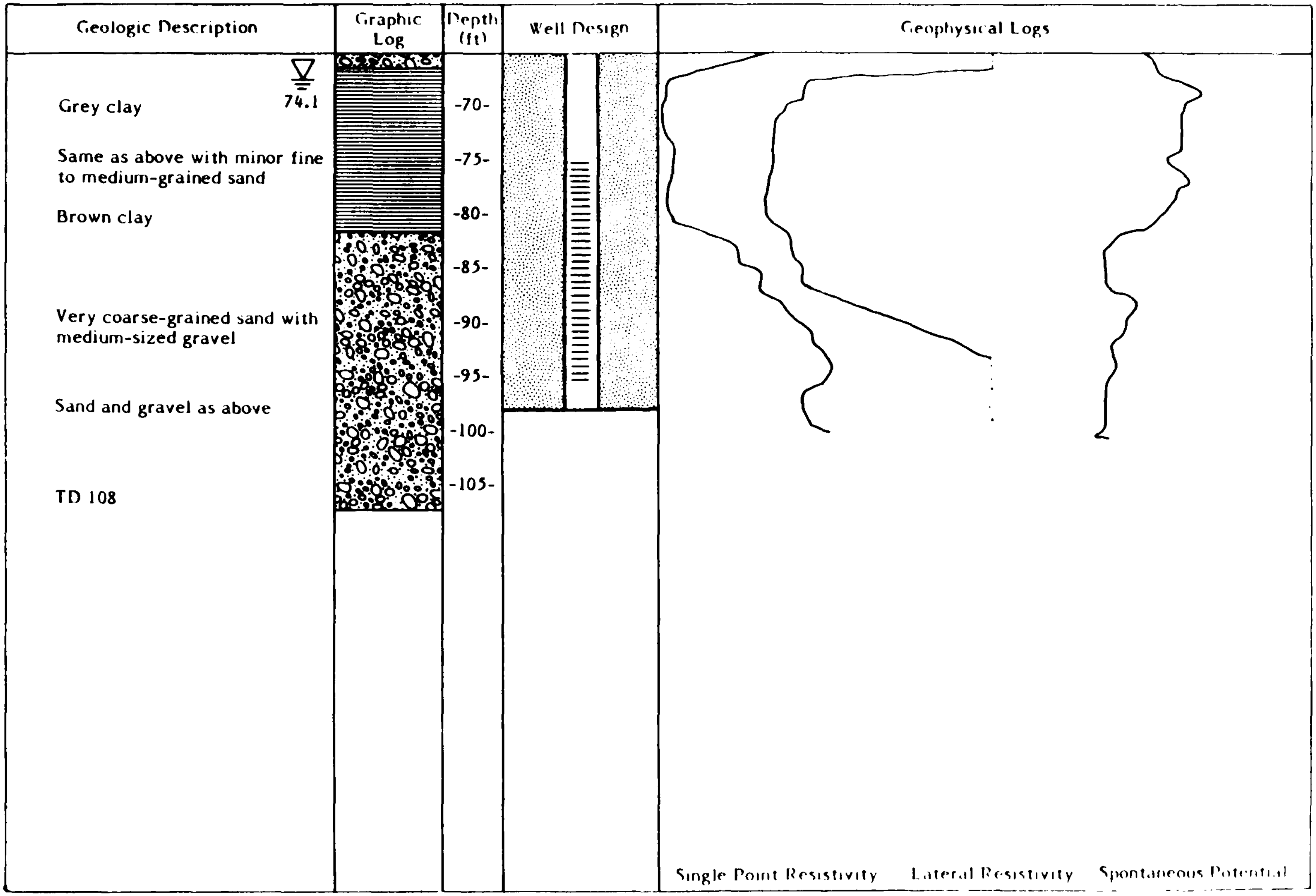
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary



AV-F-HW05

MAFB-47



AV E HW05

Well No. MAFB-48

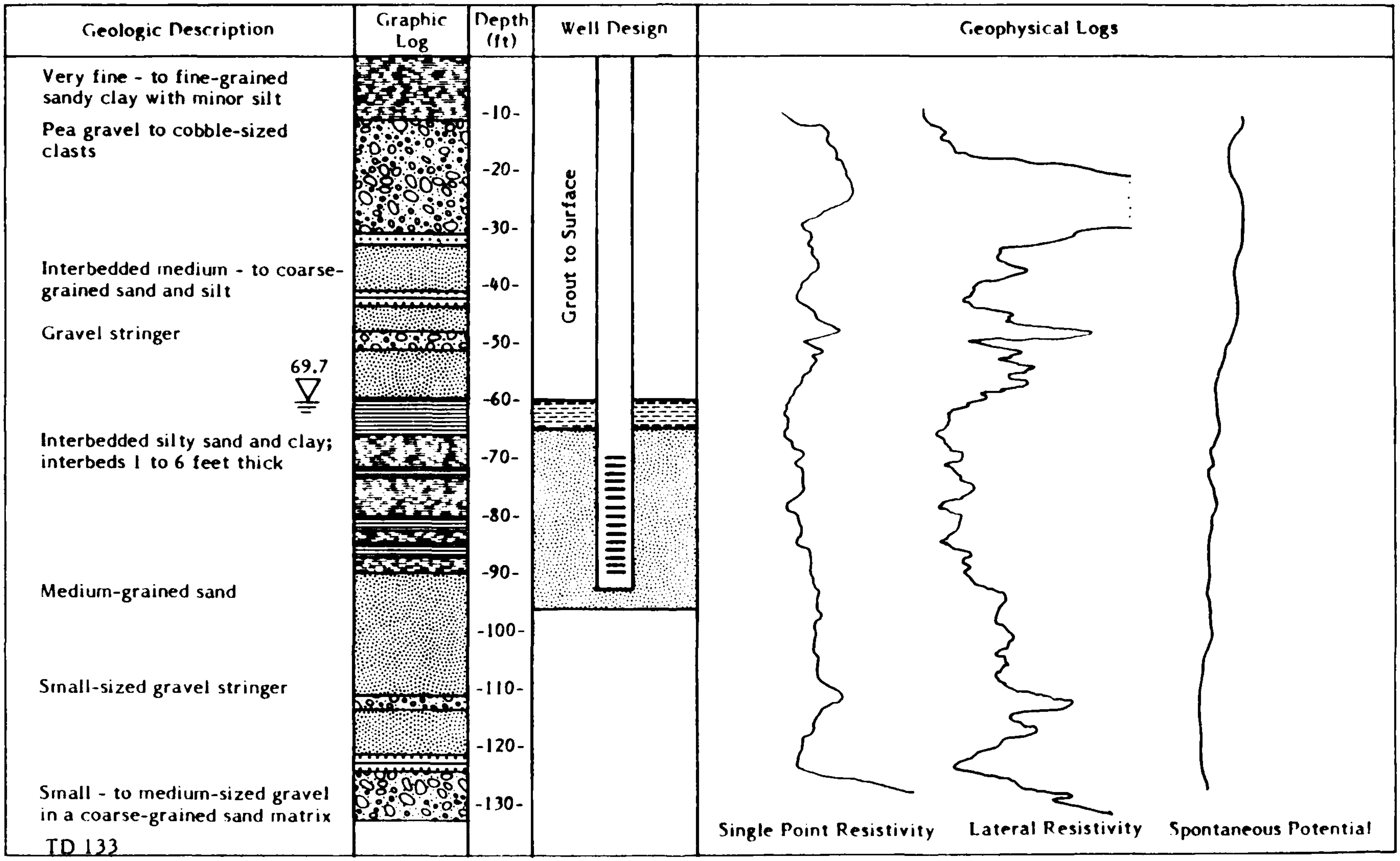
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Amber

Checked By O'Gara/Napp

Date 8/24/86



AV-F-HW05

Well No. MAFB-49

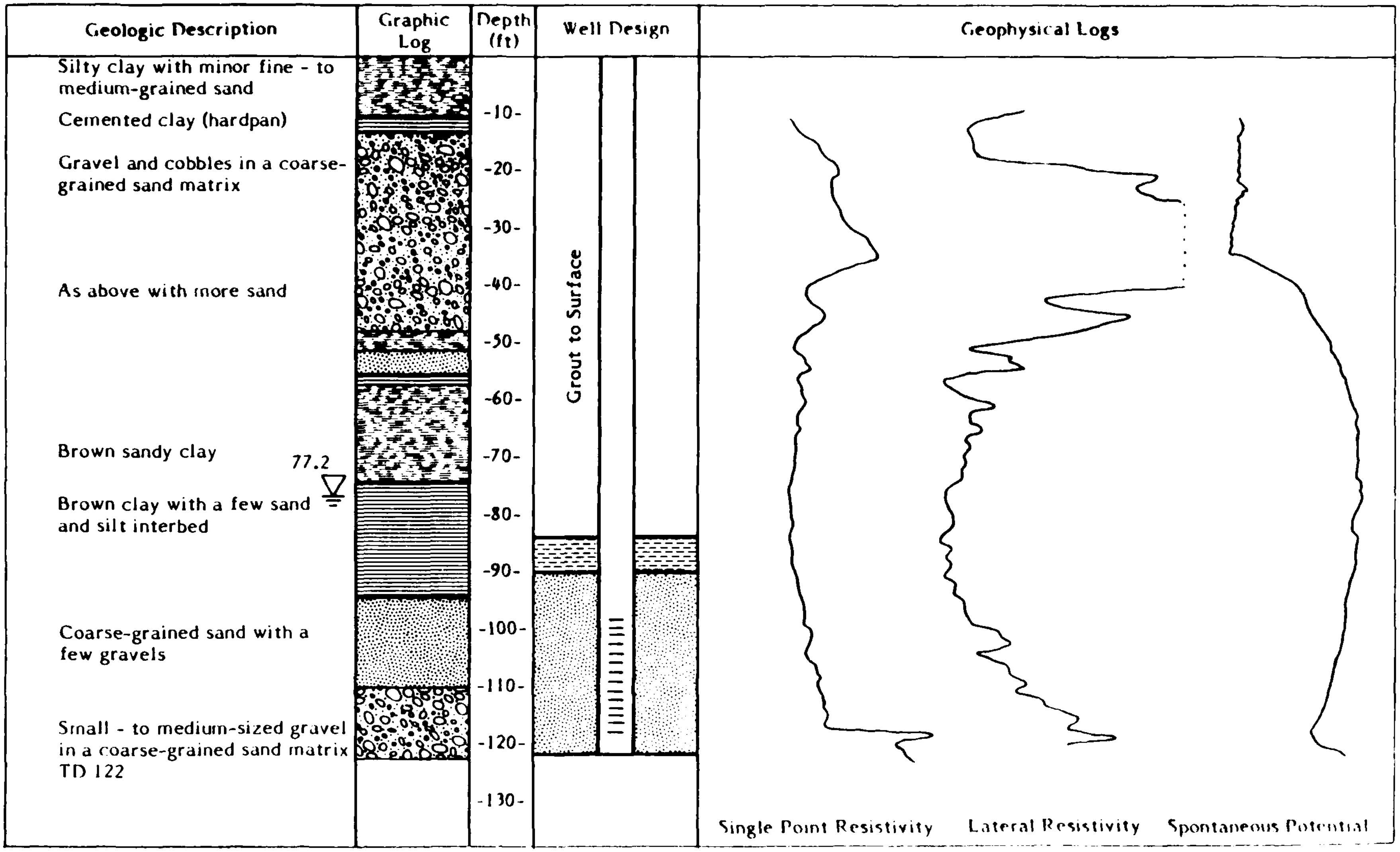
Logged By O'Gara

Project Name Mather Stage III

Checked By Napp

Drilling Method Conventional Mud Rotary

Date 9/14/86



AV-F-HW05

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Well No. MAFB-50

Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By O'Gara/Thurston

Checked By Napp

Date 9/27/86

Geologic Description	Graphic Log	Depth (ft)	Well Design	Geophysical Logs

Pea gravel in a coarse-grained sand matrix

Pea sized gravel, well-rounded

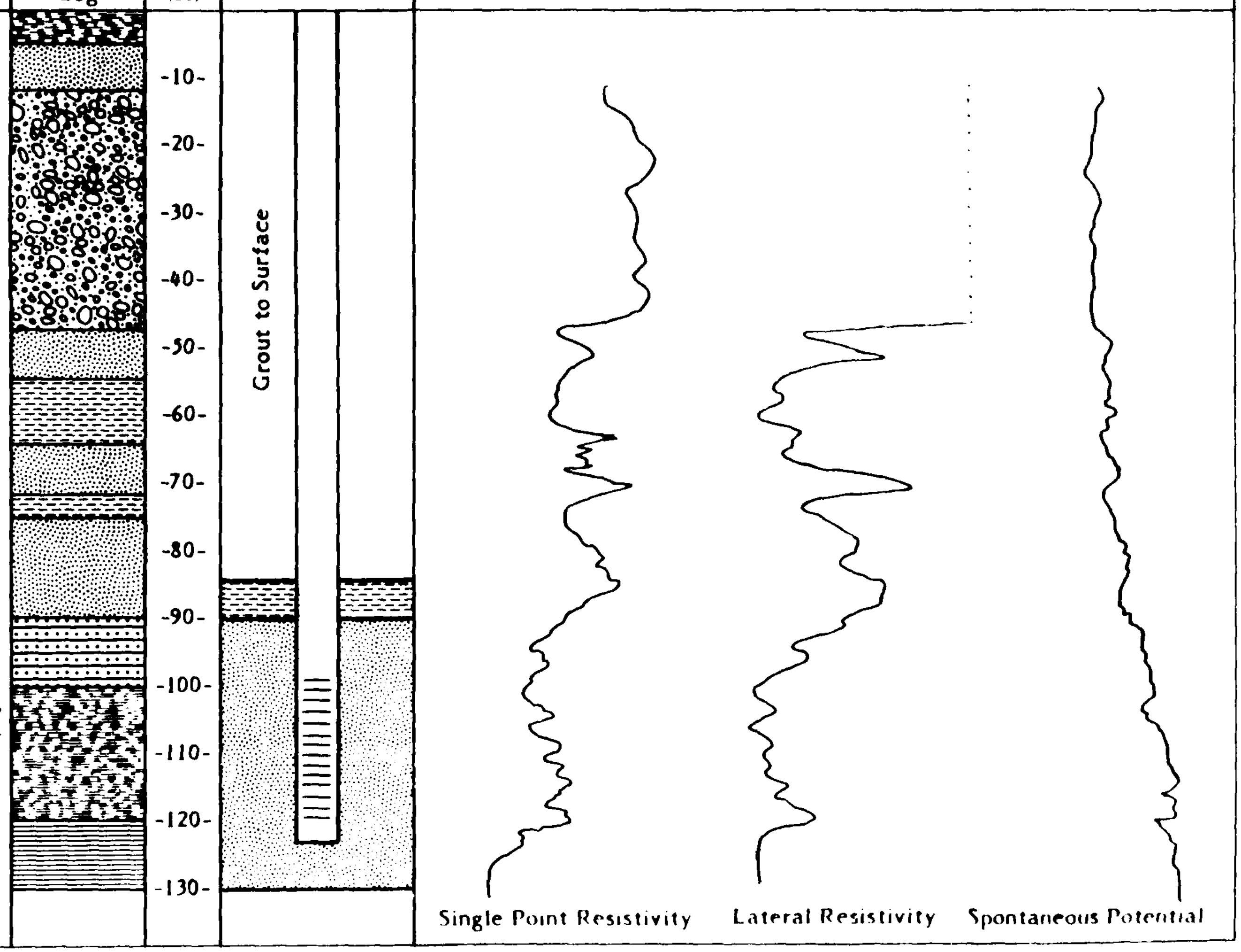
Pea and medium-sized gravel in a medium-grained sand matrix

Fine - to medium-grained sand with minor clay interbeds

Fine - to medium-grained silty sand

Interbedded silt and grey clay 104

TD 130



AV-F-HW05

Well No. MAFB-51

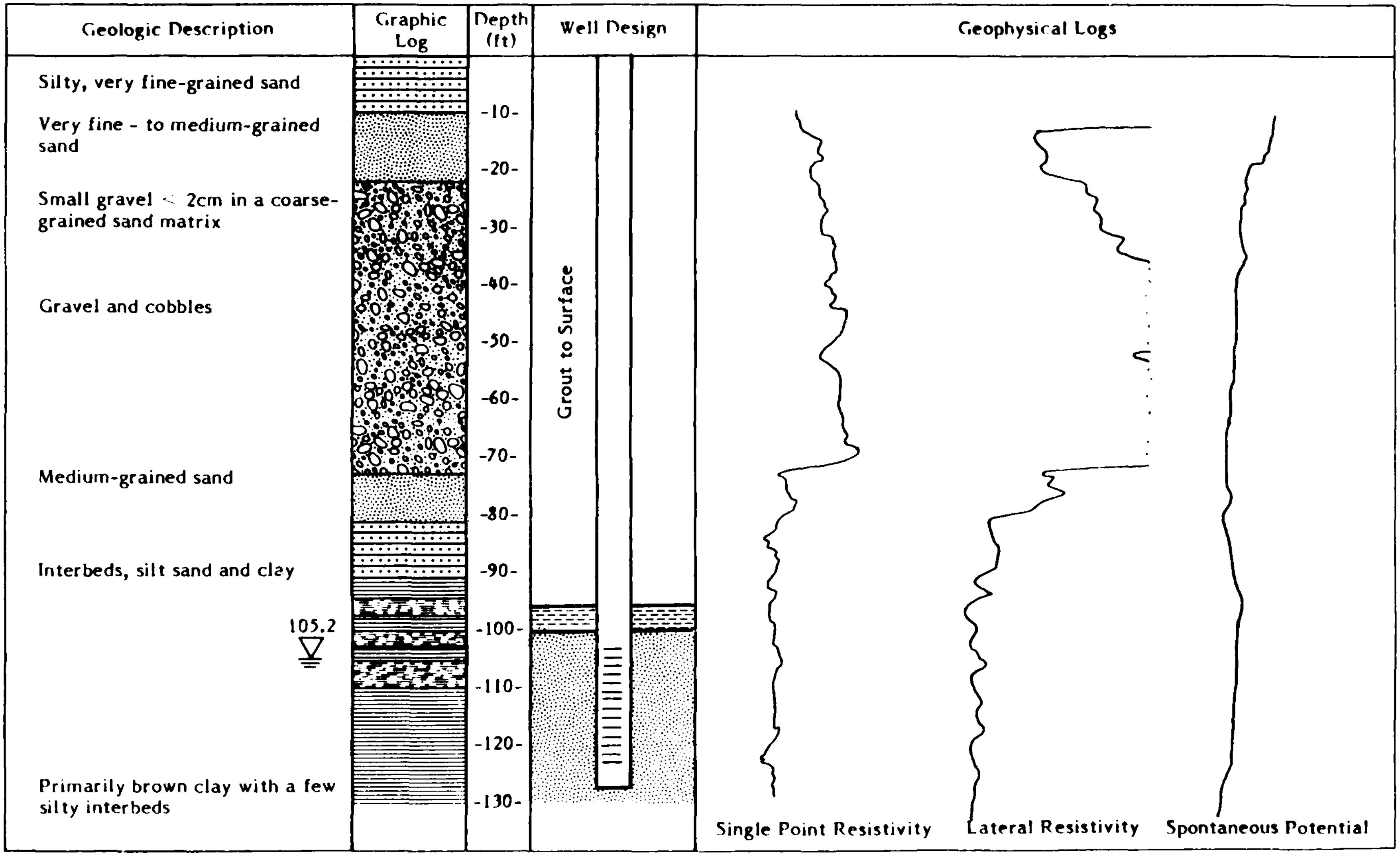
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

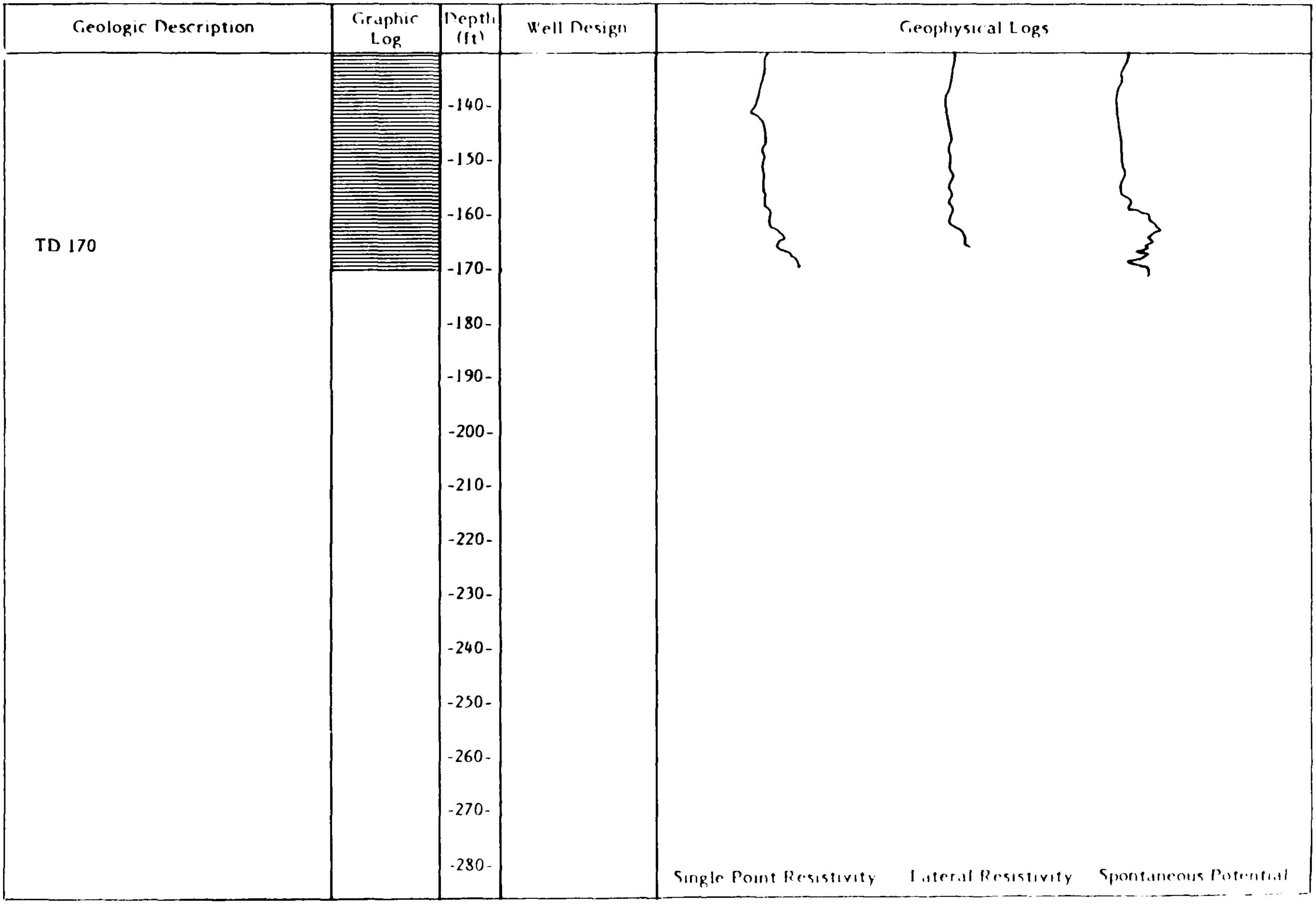
Checked By O'Gara

Date 10/8/86



AV-F-HW05

MAFB-51



AV F HW05

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Well No. MAFB-52

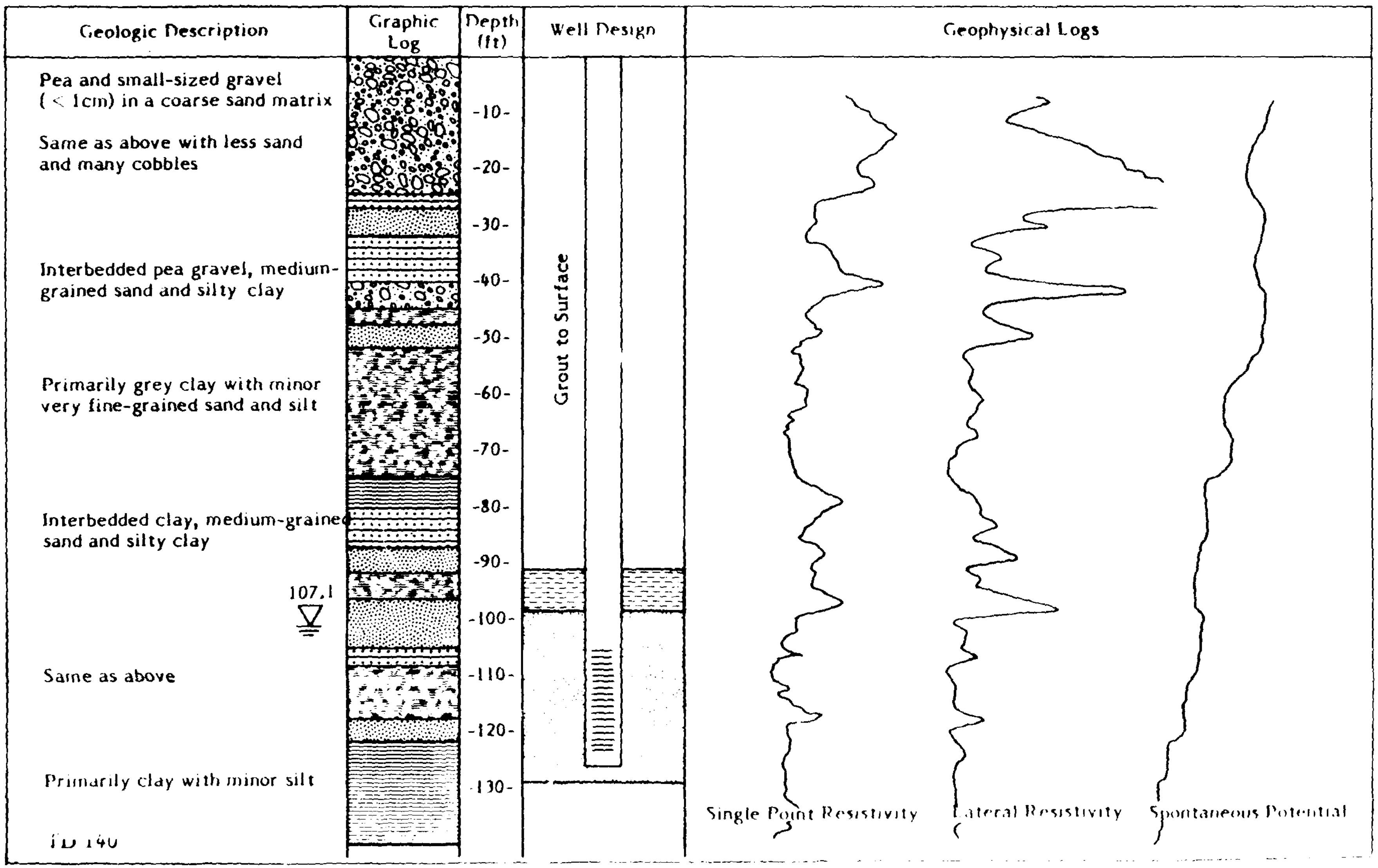
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

Checked By O'Gara

Date 10/1/86



Well No. MAFB-53

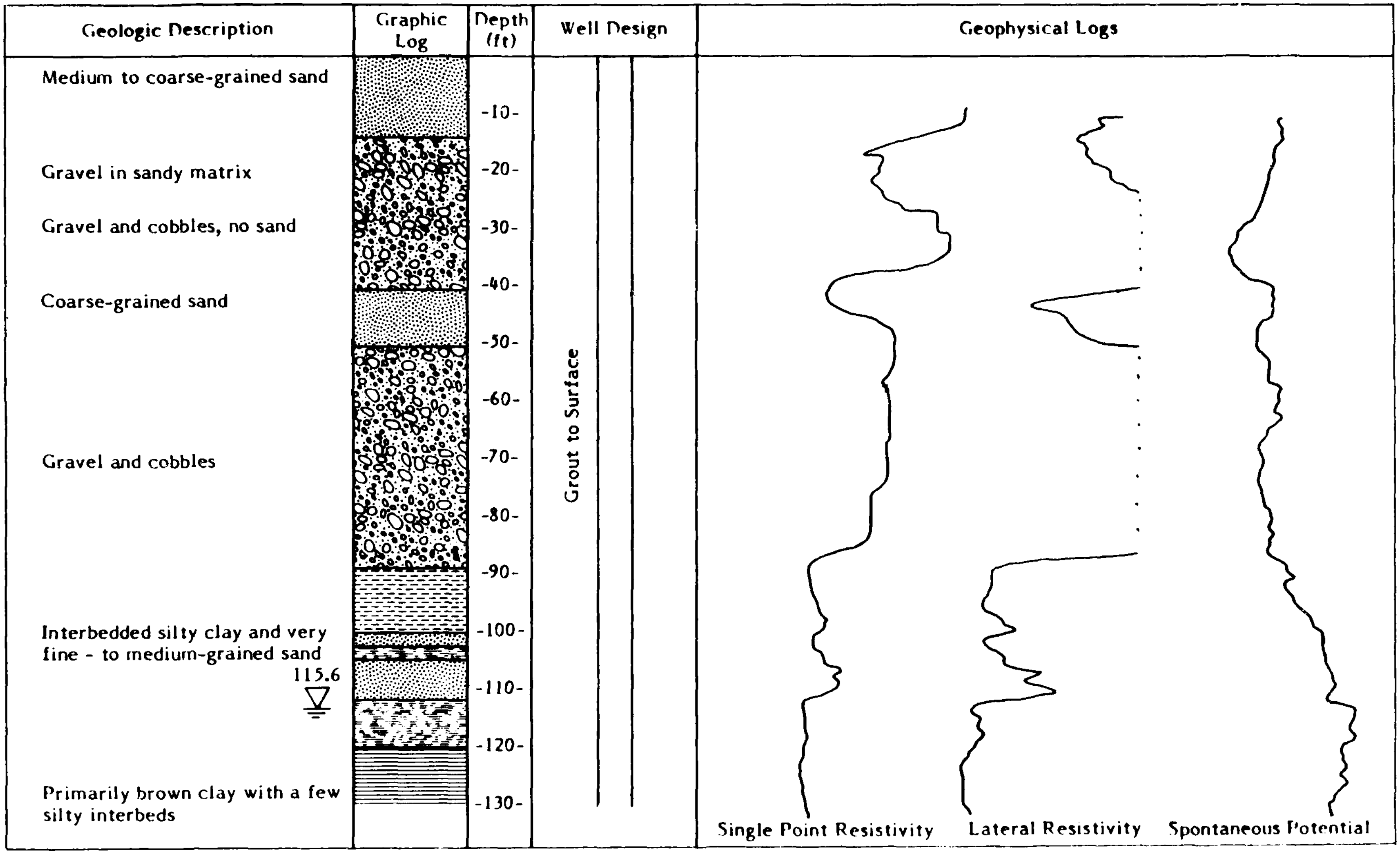
Logged By Napp

Project Name Mather Stage III

Checked By O'Gara

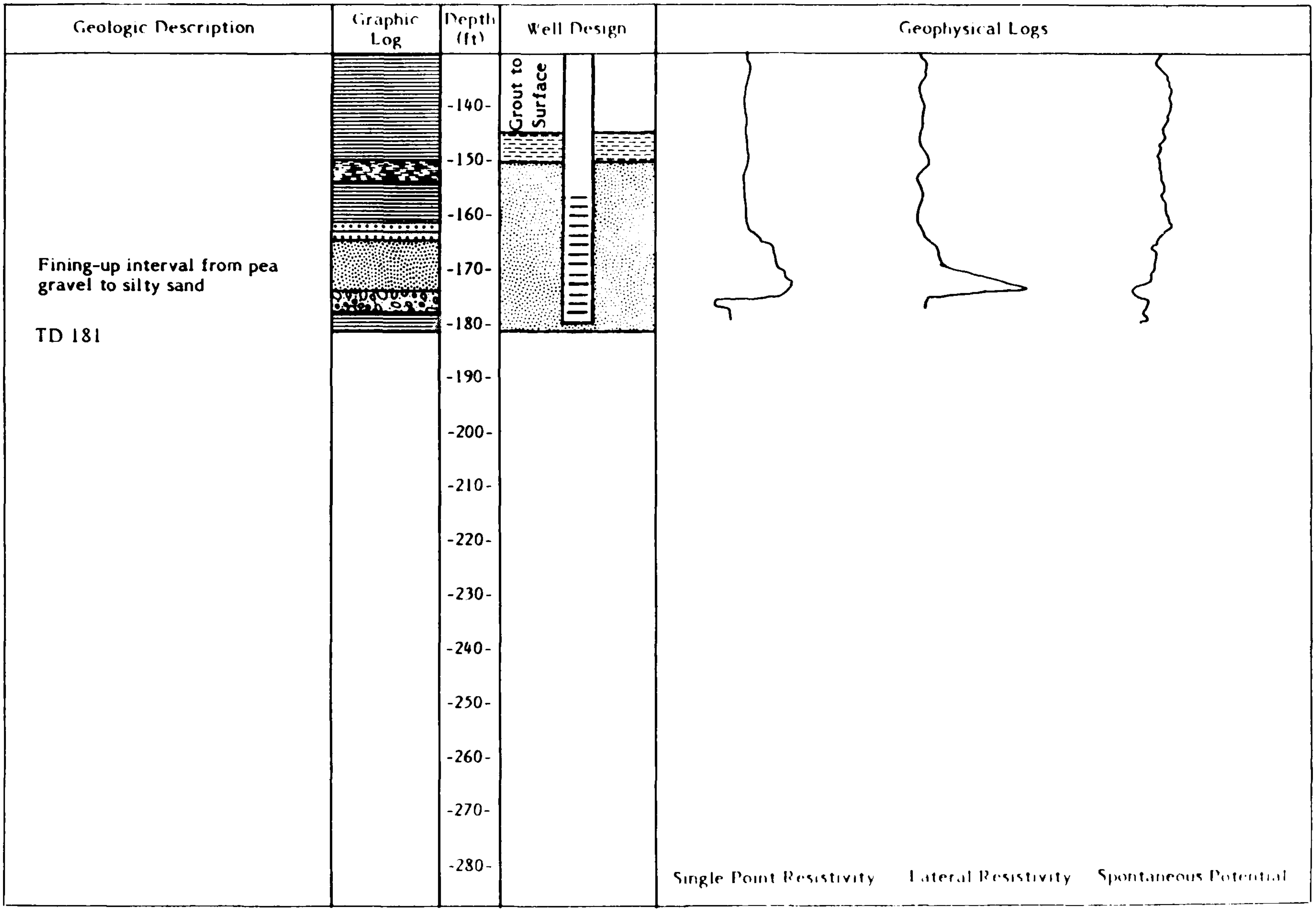
Drilling Method Conventional Mud Rotary

Date 10/9/86



AV-F-HW05

MAFB-53



AV F 11W05

Well No. MAFB-54

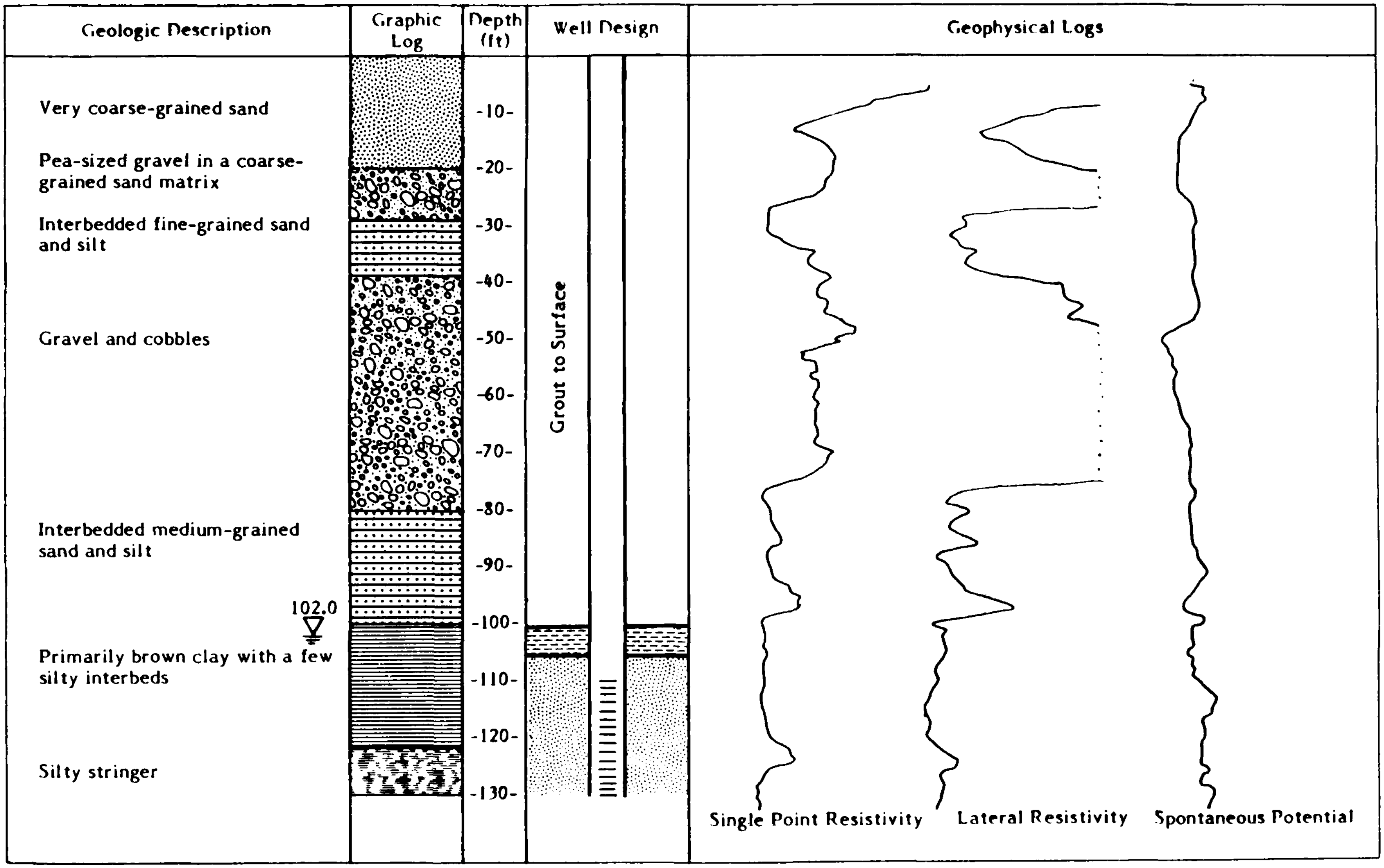
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

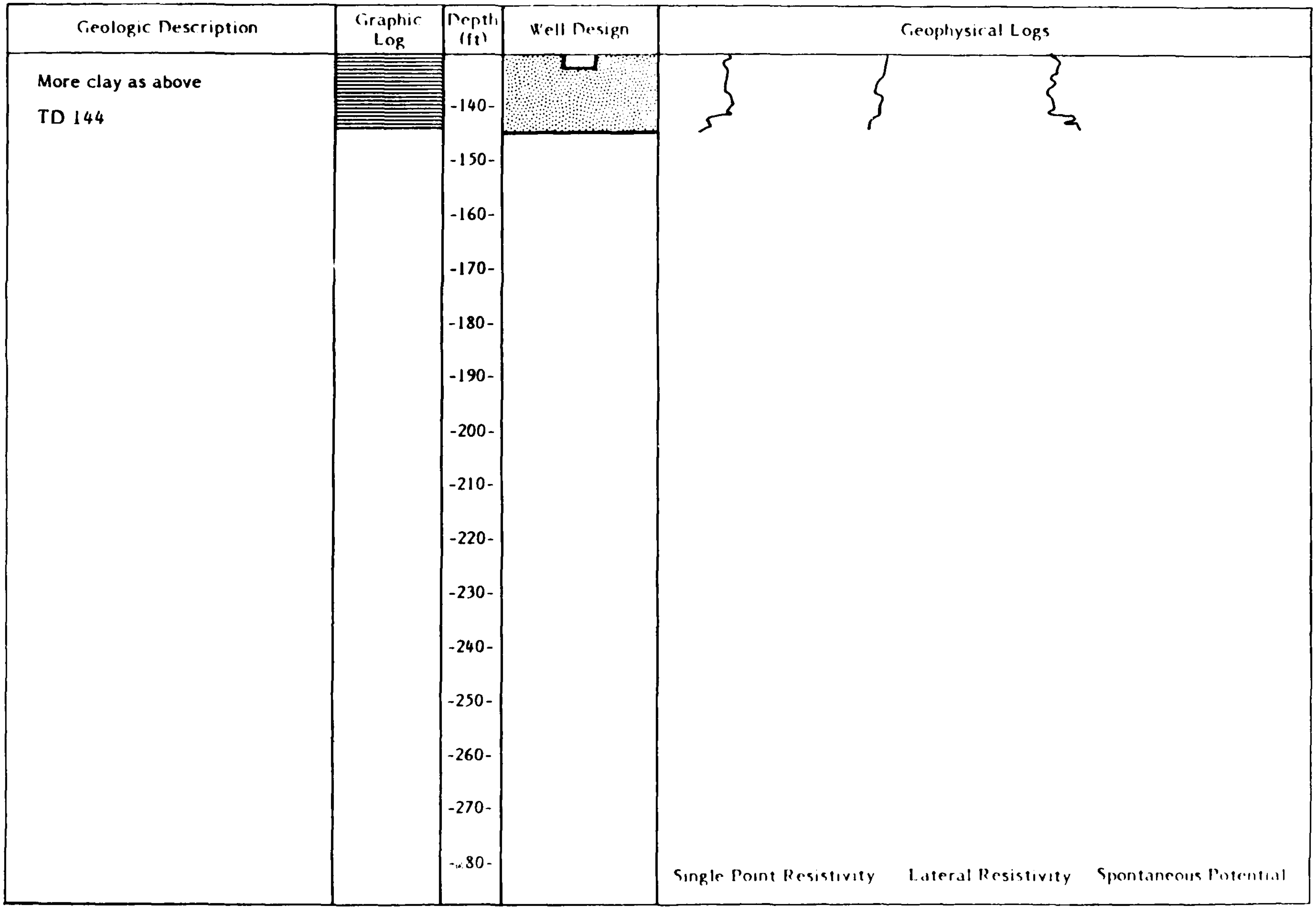
Logged By Napp

Checked By O'Gara

Date 10/5/86



MAFB-54



AV F HW05

Well No. MAFB-55

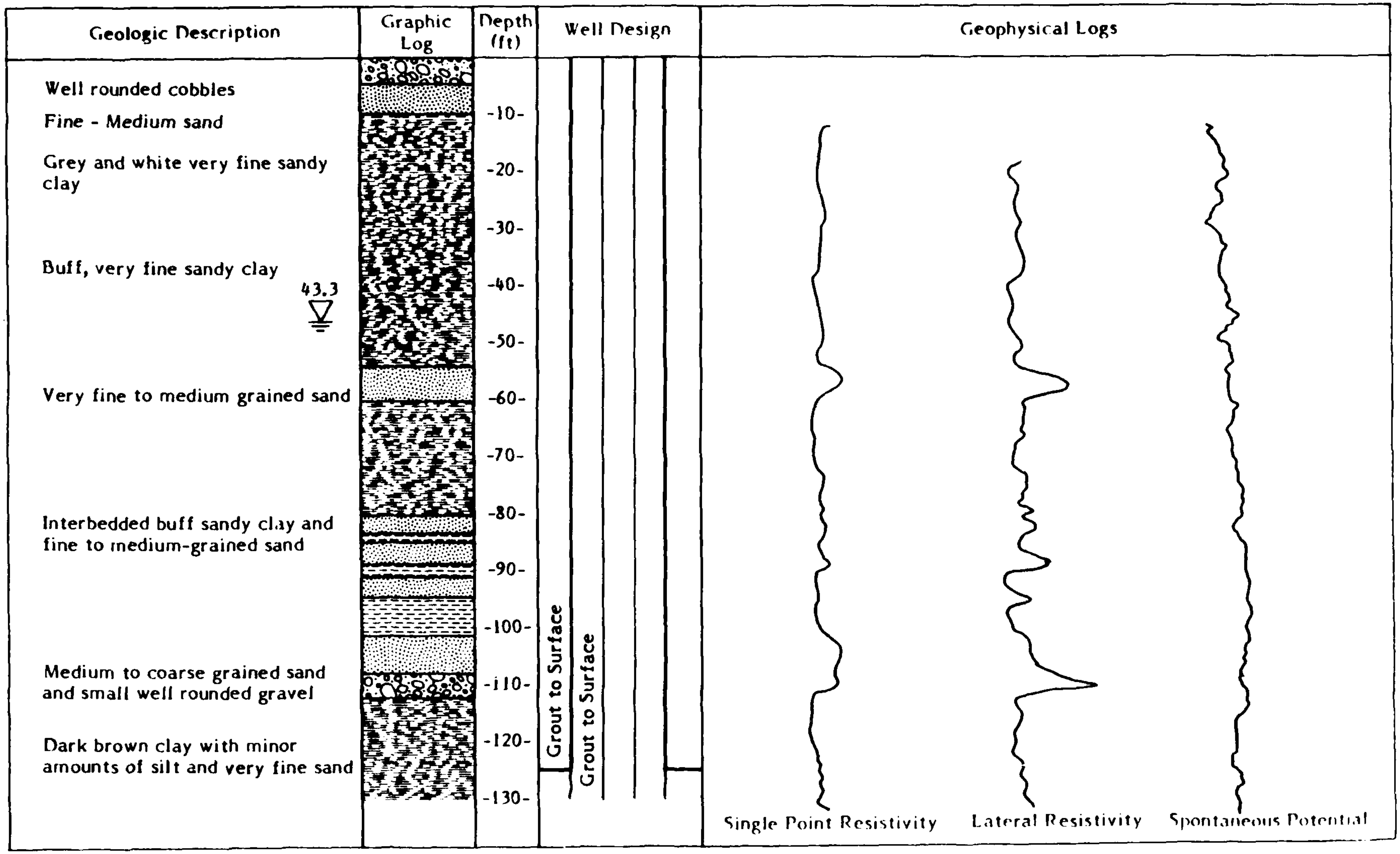
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

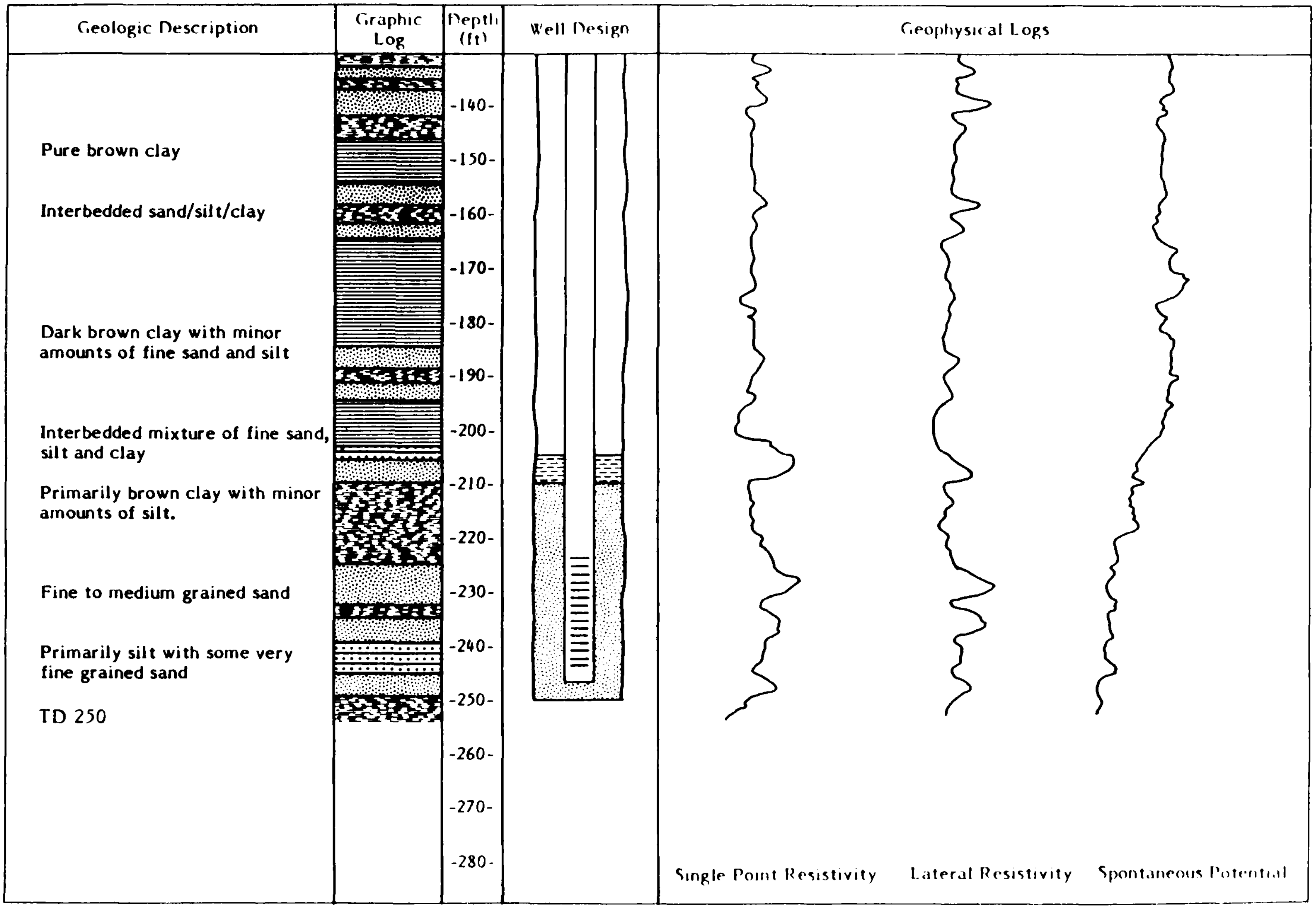
Checked By O'Gara

Date 9/21/86



AV-F-HW05

MAFB-55


Geologic Description
Graphic Log
Depth (ft)
Well Design
Geophysical Logs
Pure brown clay
Interbedded sand/silt/clay
Dark brown clay with minor amounts of fine sand and silt
Interbedded mixture of fine sand, silt and clay
Primarily brown clay with minor amounts of silt.
Fine to medium grained sand
Primarily silt with some very fine grained sand
TD 250
-140-
-150-
-160-
-170-
-180-
-190-
-200-
-210-
-220-
-230-
-240-
-250-
-260-
-270-
-280-
Single Point Resistivity
Lateral Resistivity
Spontaneous Potential

Well No. MAFB-56

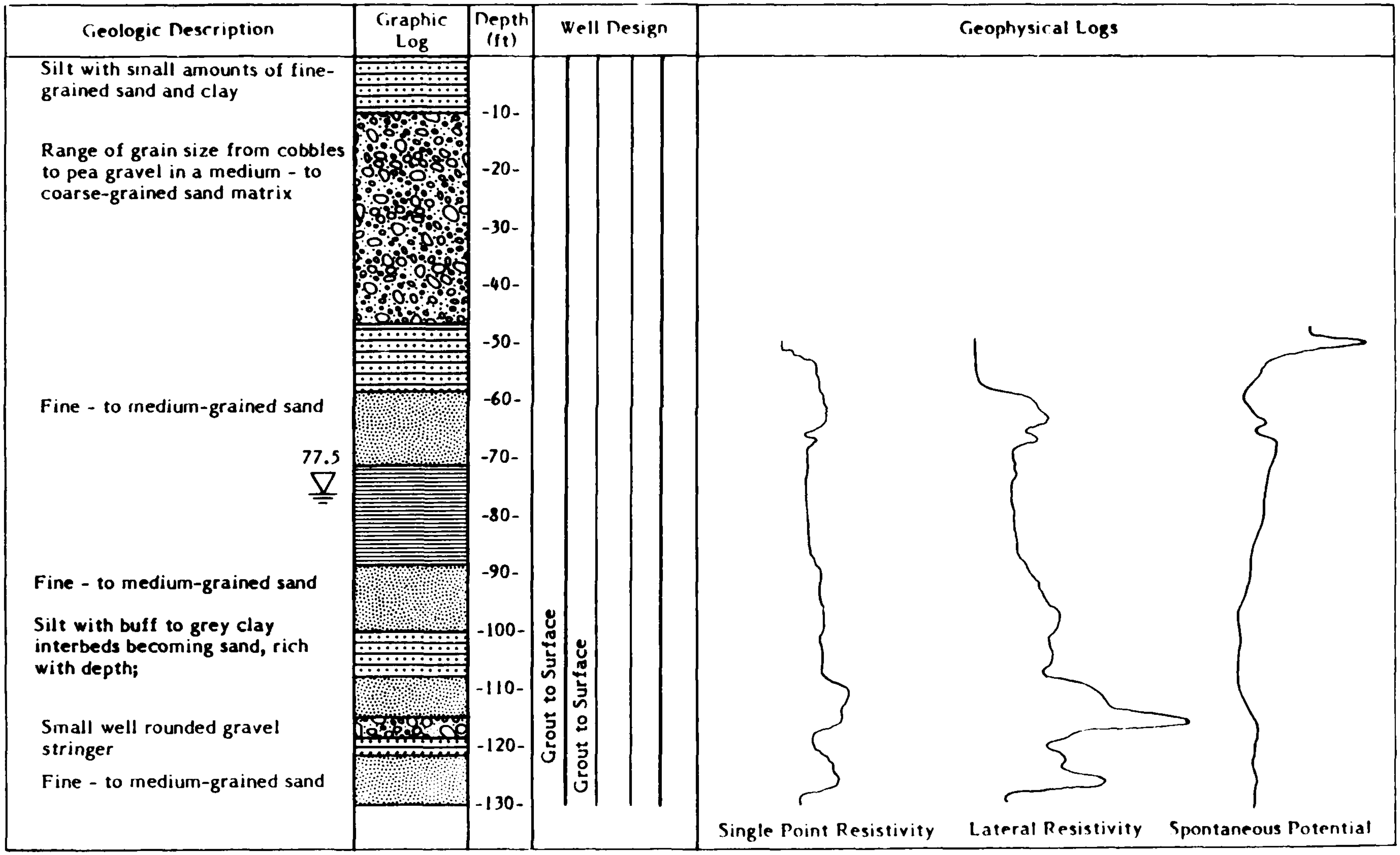
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

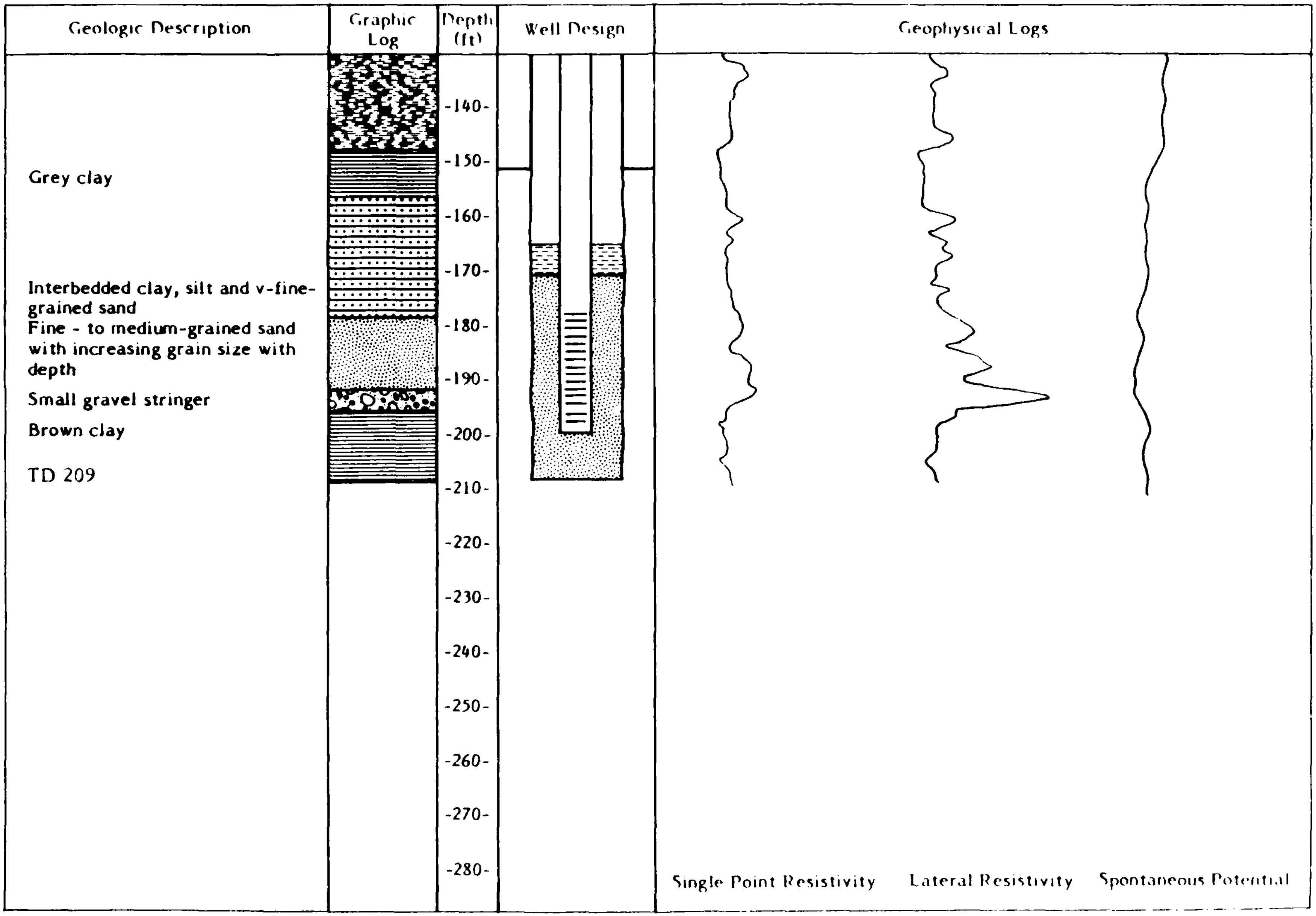
Checked By O'Gara

Date 9/25/86



AV-F-HW05

MAFB-56



AV-F-HW05

Well No. MAFB-57

Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

Checked By O'Gara

Date 9/23/86

Geologic Description

Very fine - to fine-grained sandy silt with minor amounts of brown clay

Range of grain size from well rounded cobbles to pea gravel in a coarse-grained sand matrix

Fine - to medium-grained sand

Pea gravel to cobble sized clasts in a sand matrix

Interbedded silt and brown and grey clay; interbeds 1-4 feet thick 78.6

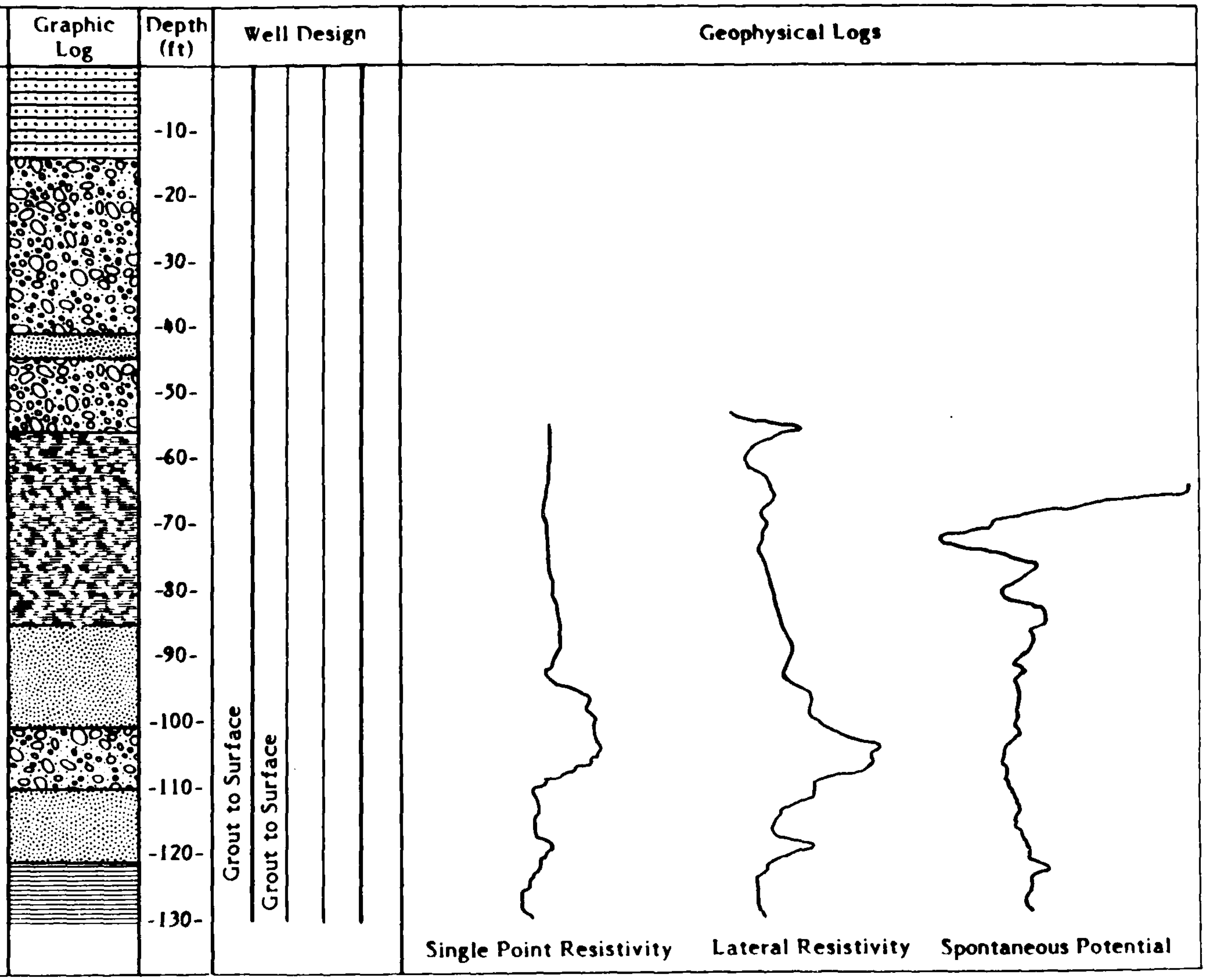
Becoming sandy

Fine - to medium-grained sand

Small gravel in a coarse sand matrix

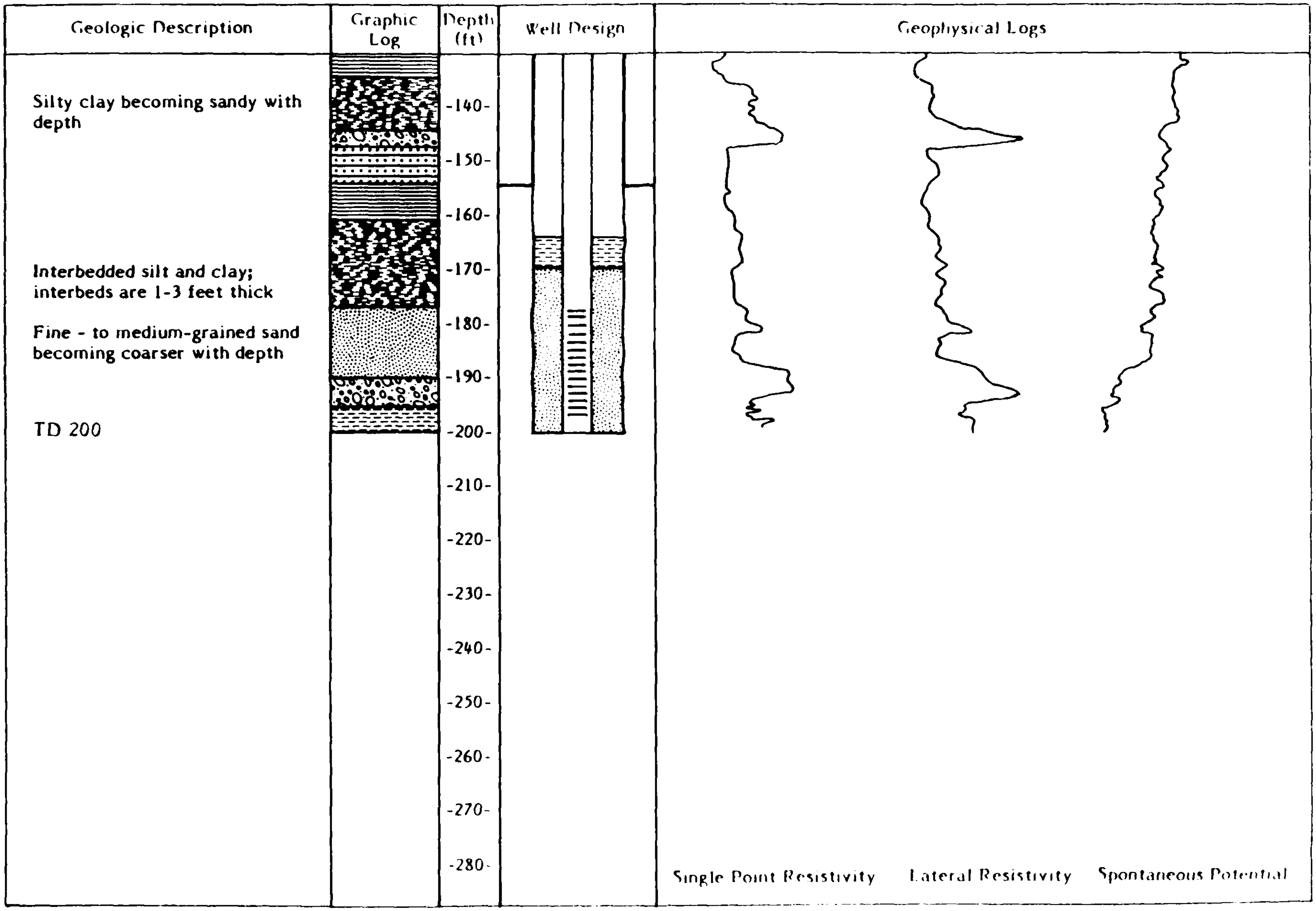
Very-fine to fine grained sand

Brown clay



AV-F-HW05

MAFB-57


Geologic Description
Graphic Log
Depth (ft)
Well Design
Geophysical Logs
Silty clay becoming sandy with depth
Interbedded silt and clay; interbeds are 1-3 feet thick
Fine - to medium-grained sand becoming coarser with depth
TD 200
-140-
-150-
-160-
-170-
-180-
-190-
-200-
-210-
-220-
-230-
-240-
-250-
-260-
-270-
-280-
Single Point Resistivity
Lateral Resistivity
Spontaneous Potential

Well No. MAFB-58

Logged By Napp

Project Name Mather Stage III

Checked By O'Gara

Drilling Method Conventional Mud Rotary

Date 9/23/86

Geologic Description	Graphic Log	Depth (ft)	Well Design	Geophysical Logs

Clast size ranges from coarse-grained sand to cobbles

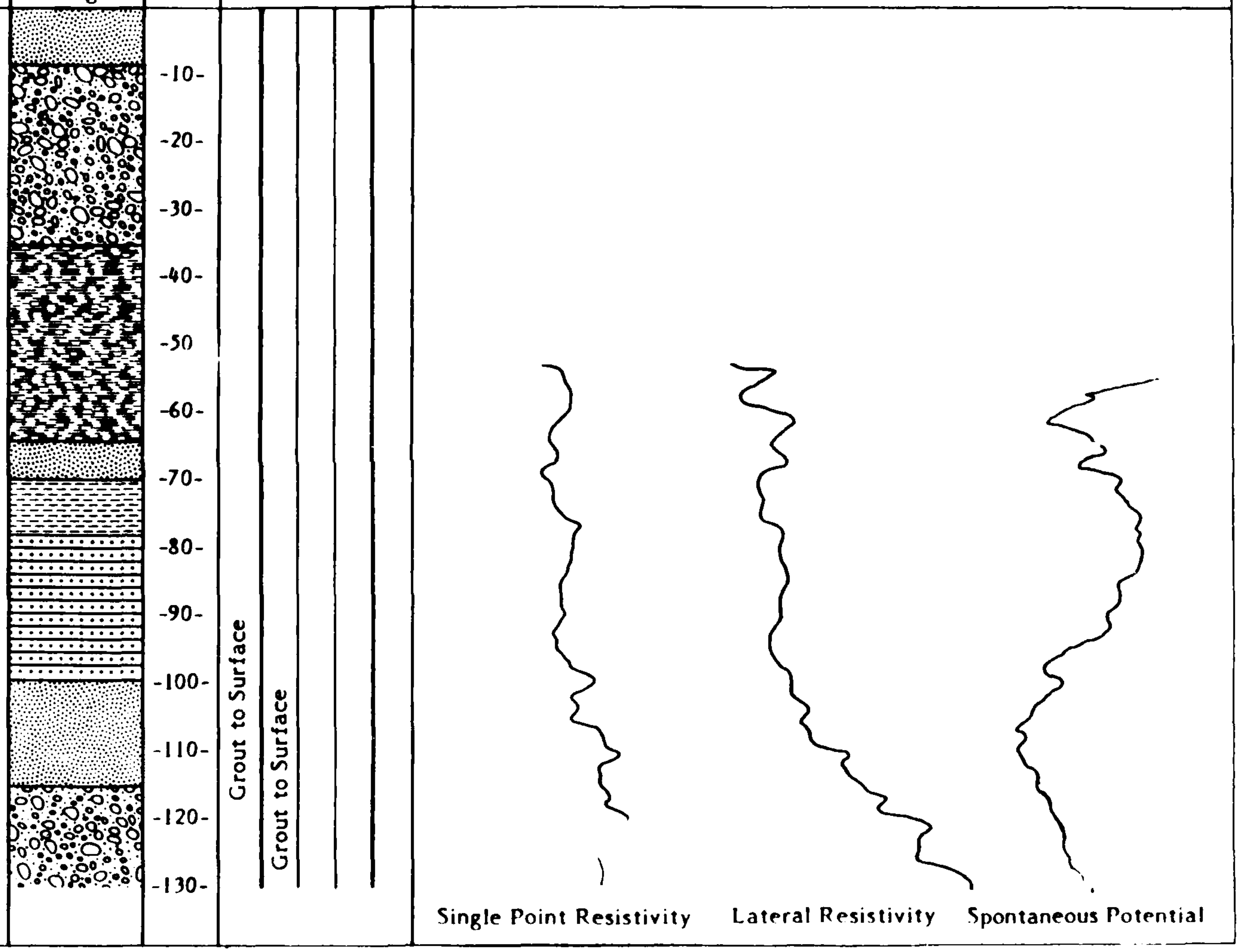
Very fine - to fine-grained sand

80.7

Few pebbles floating in a sandy silt matrix with an increase in gravel content with depth

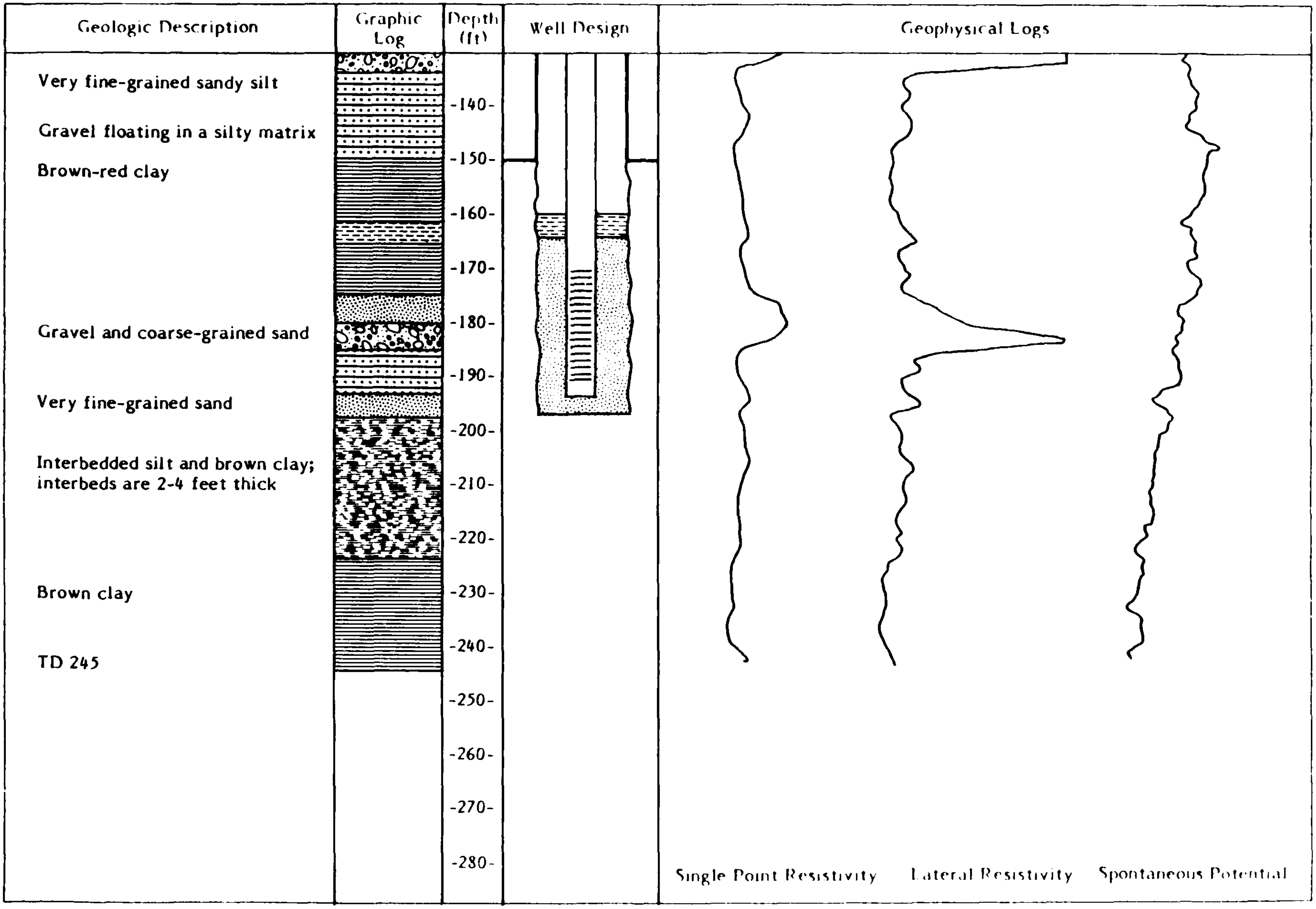
Gravel and cobbles in a coarse-grained sand matrix

Well rounded gravel and cobbles



AV-F-HW05

MAFB-58



AV F HW05

Well No. MAFB-59

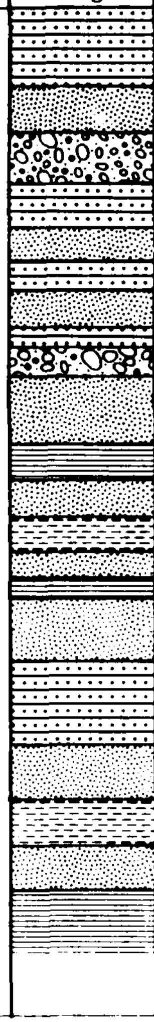
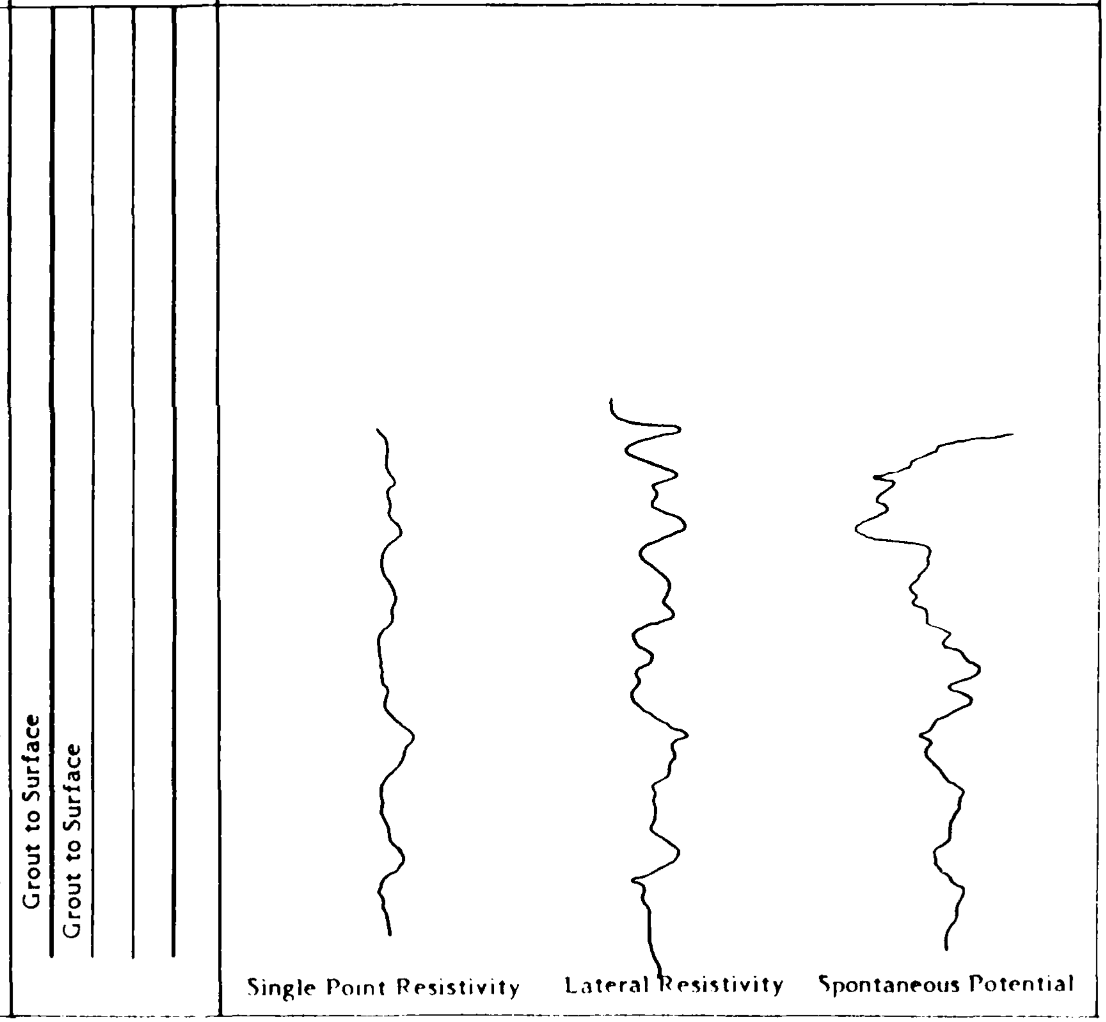
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

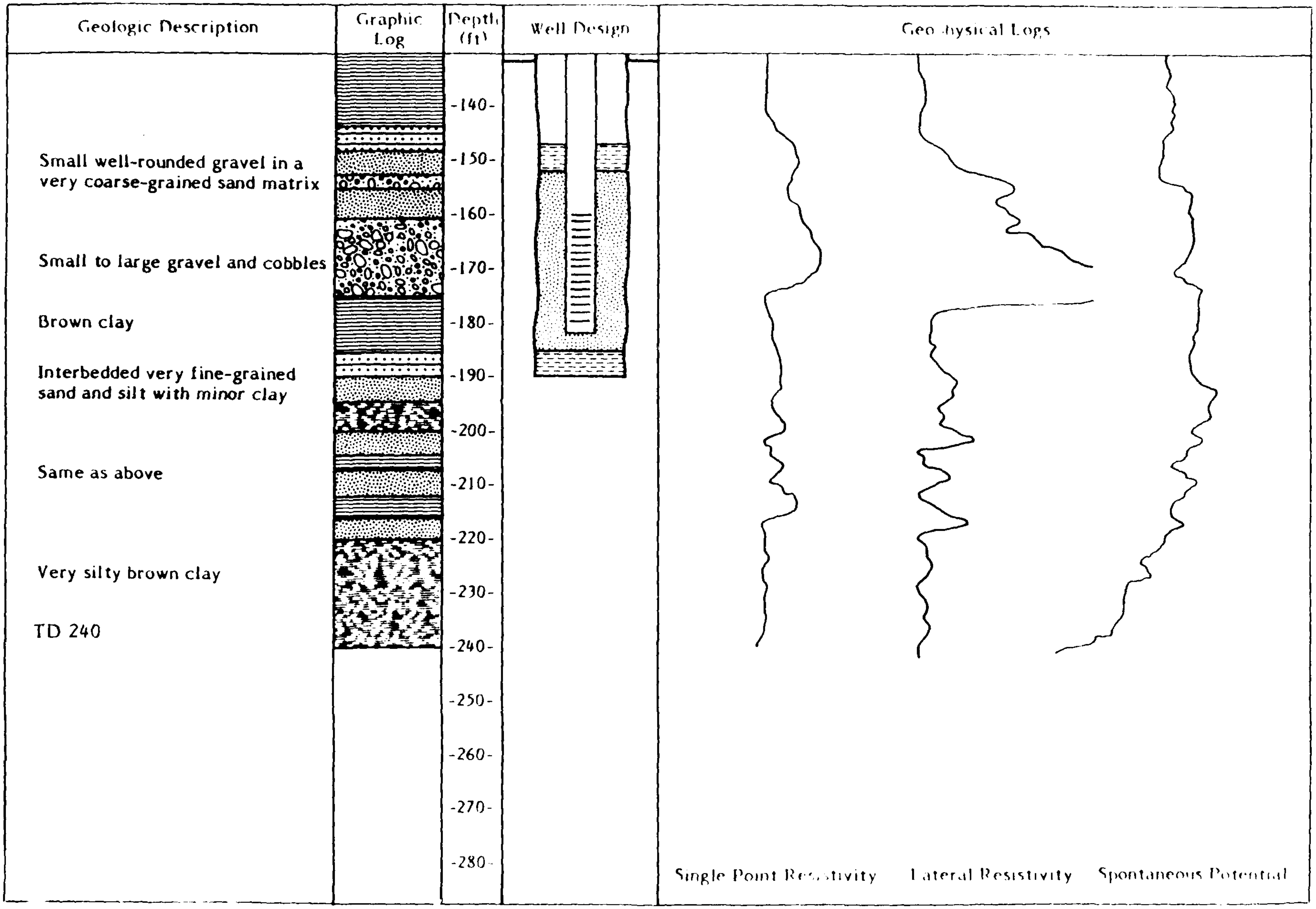
Checked By O'Gara

Date 9/23/86

Geologic Description	Graphic Log	Depth (ft)	Well Design	Geophysical Logs
Very fine - to fine-grained sand with silt and minor clay Medium-grained sand Gravel in coarse-grained sand matrix Alternating 2-3 foot thick beds of sand and mixed sand and silt Gravel in a coarse-grained sand matrix Interbedded clay, silty clay and medium-grained sand 75.1 Medium-grained clay Very fine - to fine-grained sand Brown clay		-10- -20- -30- -40- -50- -60- -70- -80- -90- -100- -110- -120- -130-		

AV-F-HW05

MAFB-59



AV F HW05

Well No. MAFB-60

Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By O'Gara/Thurston

Checked By Napp

Date 6/26/86

Geologic Description

Very fine-grained sandy silt

Very fine - to very coarse-grained sand with minor silt and gravel

Cobbles 3-4" diameter

Medium-grained sandy clay

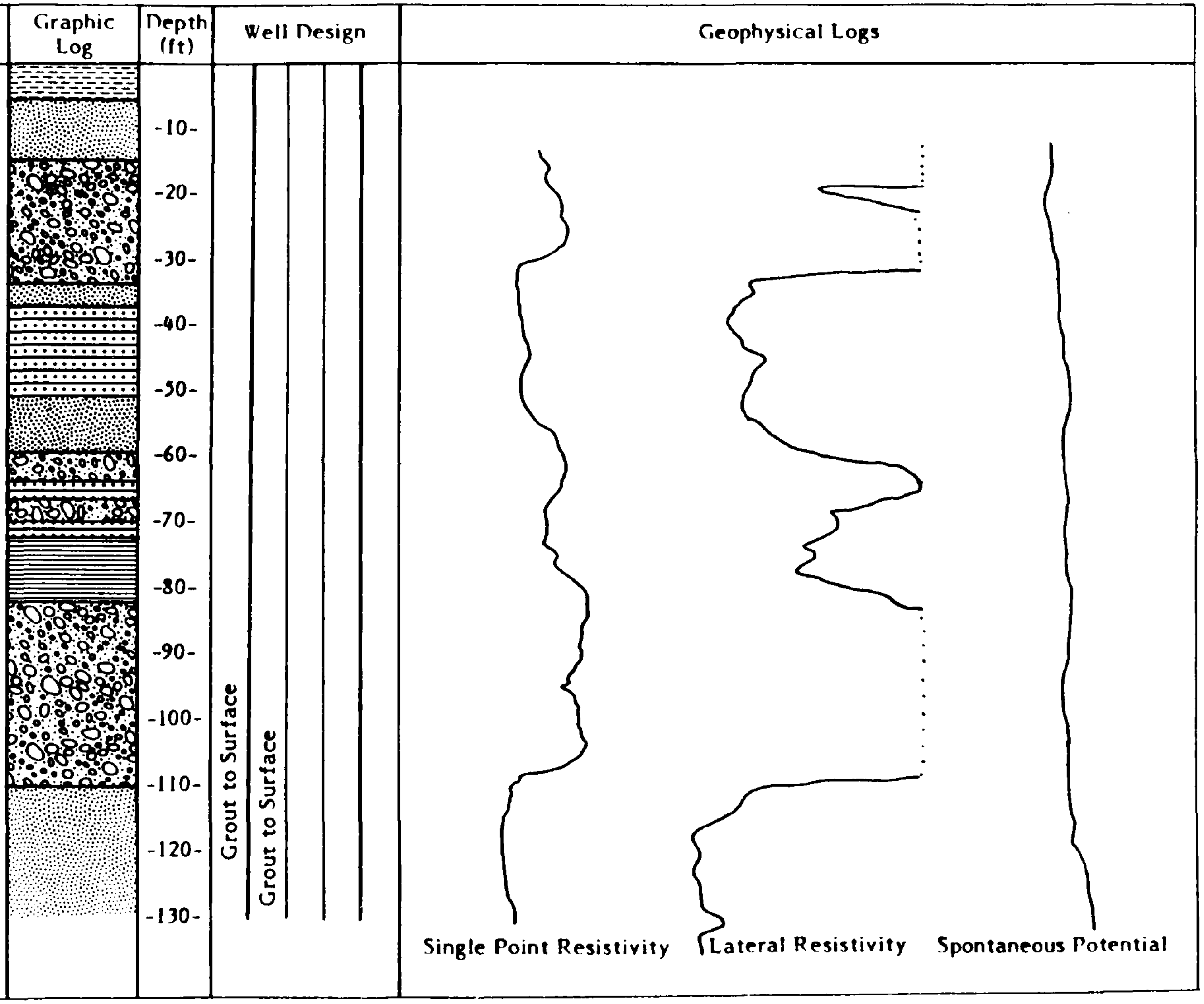
Interbedded sand, clay and silt; interbeds 2-6 feet thick

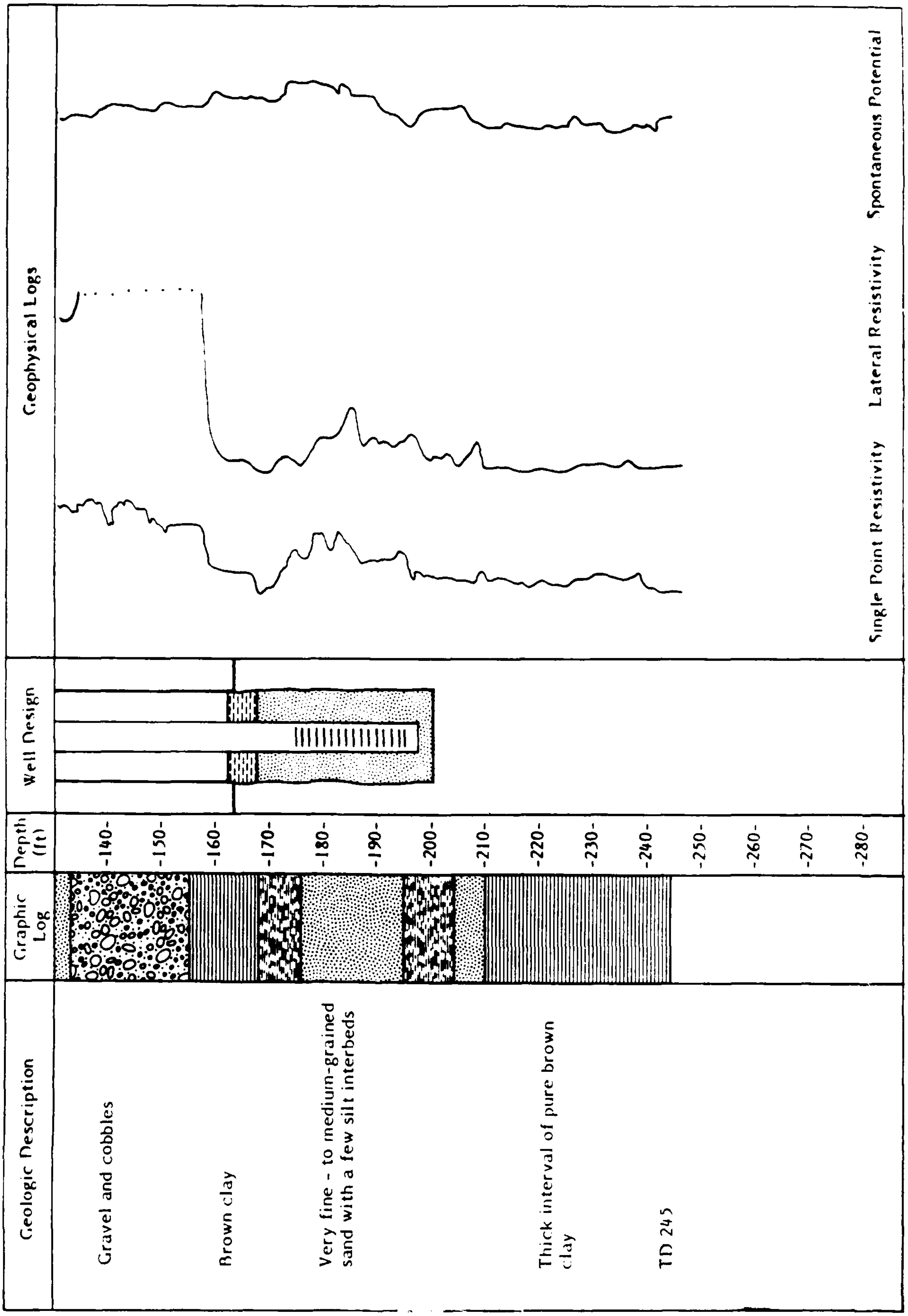
Brown clay

Very coarse-grained sand with medium-sized gravel

Medium - to very coarse-grained sand

As above with minor gravel




Geologic Description
Graphic Log
Depth (ft)
Well Design
Geophysical Logs
Gravel and cobbles
Brown clay
Very fine - to medium-grained sand with a few silt interbeds
Thick interval of pure brown clay
TD 245
-140-
-150-
-160-
-170-
-180-
-190-
-200-
-210-
-220-
-230-
-240-
-250-
-260-
-270-
-280-
Single Point Resistivity
Lateral Resistivity
Spontaneous Potential

AV-F-HW05

Well No. MAFB-61

Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

Checked By O'Gara

Date 9/7/86

Geologic Description

Silt with minor amounts of fine-grained sand

Small to medium-size gravel with some coarse-grained sand, increasing sand content with depth

Pea to small-sized gravel in a medium-grained sand matrix

As above with more gravel and less sand

Medium-grained sand

Micaceous medium-grained sand

50% medium - to coarse-grained sand 50% pea gravel

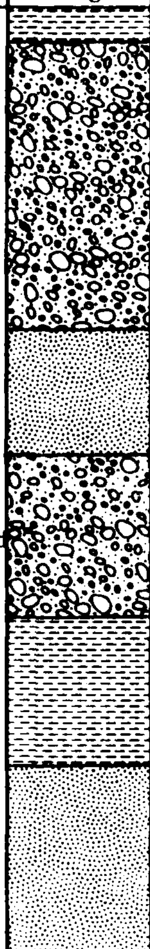
80.5

Brown silt

Interbedded silt and fine - to medium-grained sand

Primarily fine - to medium-grained sand with a few clay interbeds

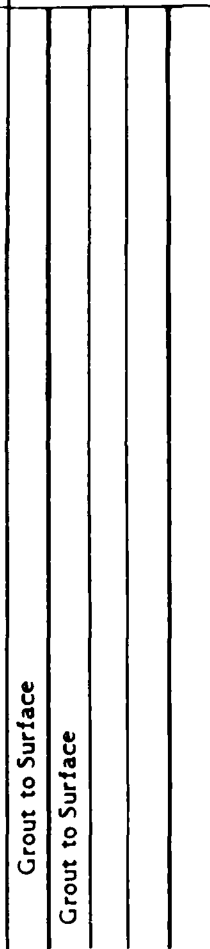
Graphic Log



Depth (ft)

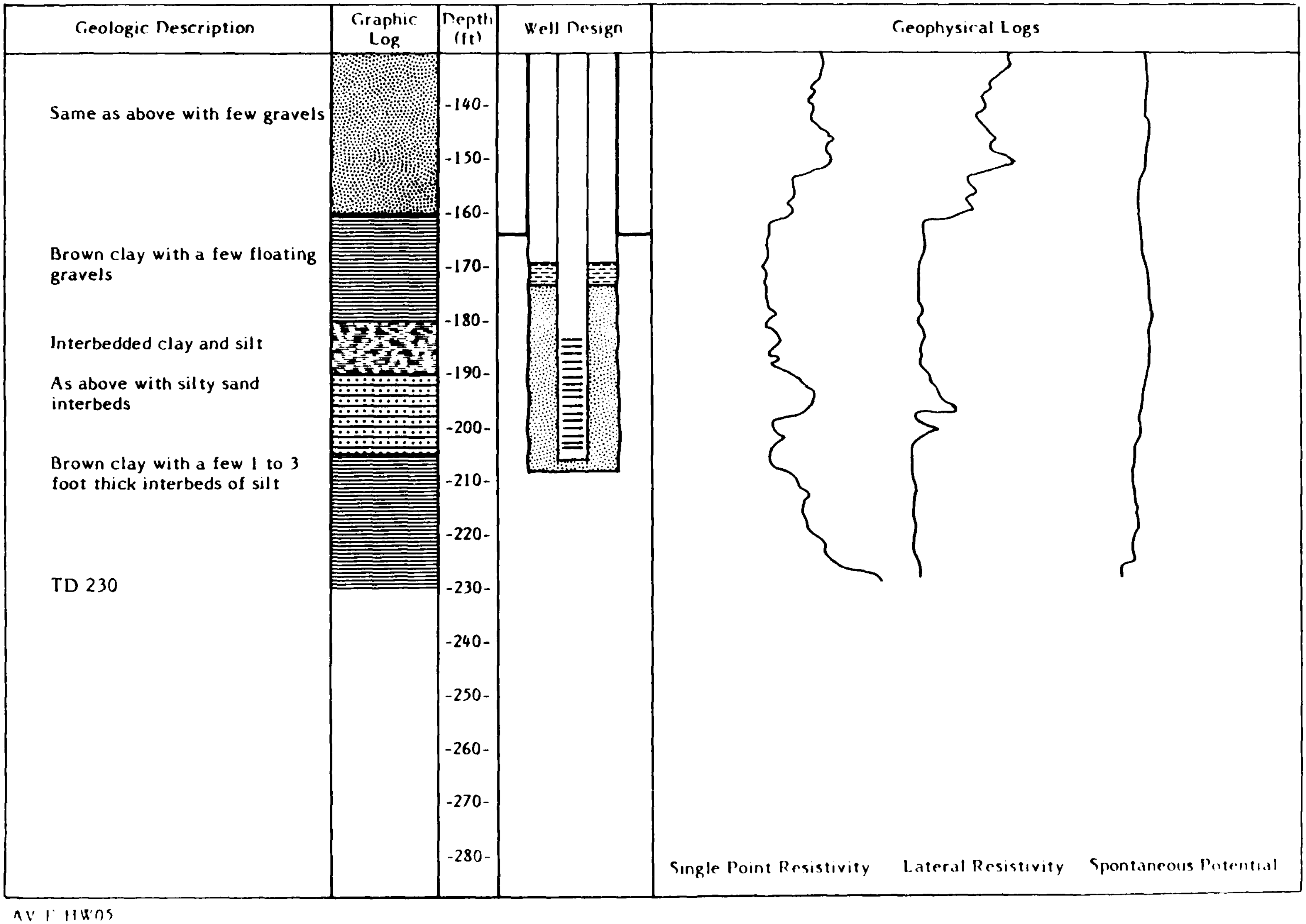
-10-
-20-
-30-
-40-
-50-
-60-
-70-
-80-
-90-
-100-
-110-
-120-
-130-

Well Design



Geophysical Logs

MAFB-61


Geologic Description
Graphic Log
Depth (ft)
Well Design
Geophysical Logs
Same as above with few gravels
Brown clay with a few floating gravels
Interbedded clay and silt
As above with silty sand interbeds
Brown clay with a few 1 to 3 foot thick interbeds of silt
TD 230
-140-
-150-
-160-
-170-
-180-
-190-
-200-
-210-
-220-
-230-
-240-
-250-
-260-
-270-
-280-
Single Point Resistivity
Lateral Resistivity
Spontaneous Potential
AV F HW05

Well No. MAFB-62

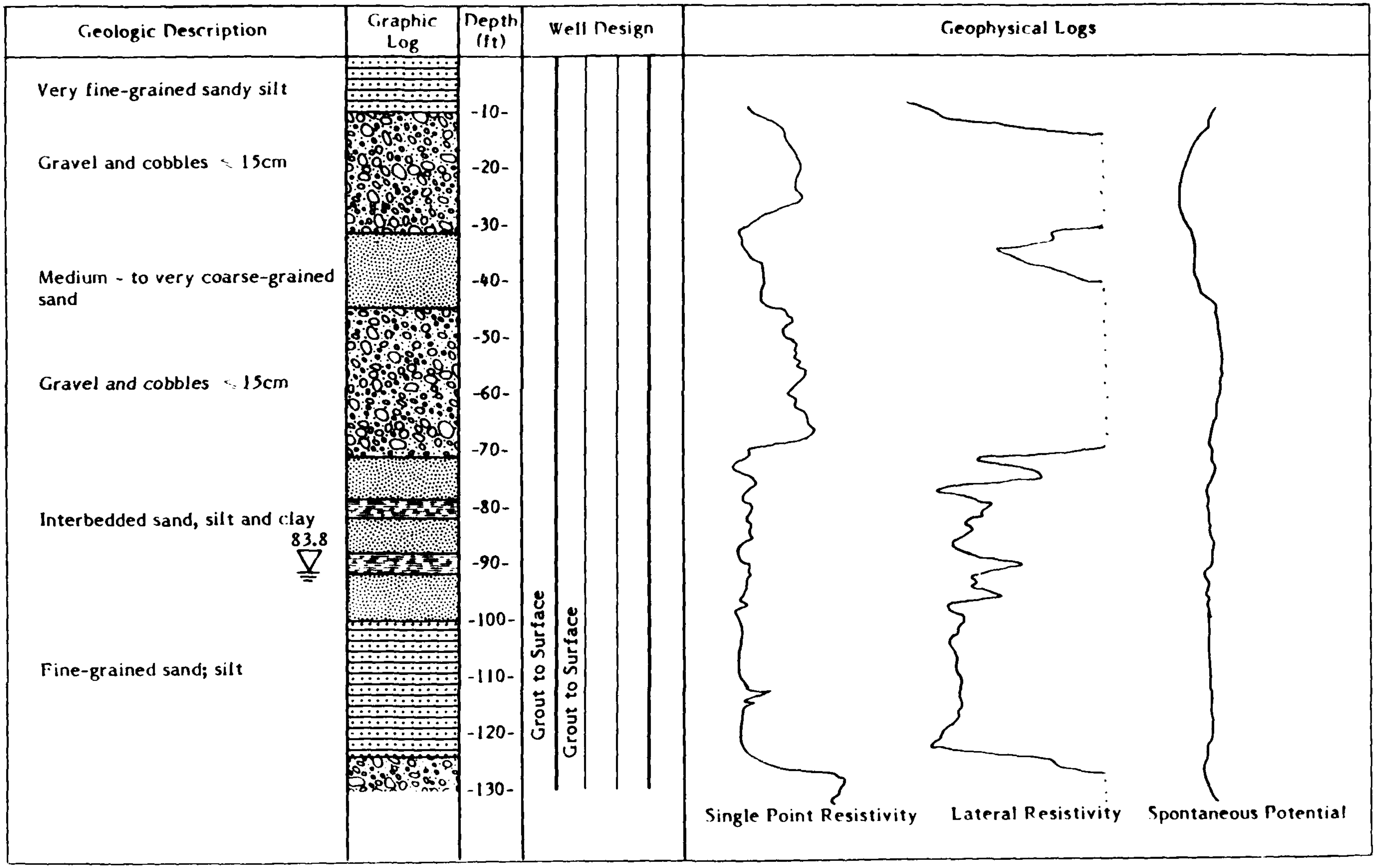
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

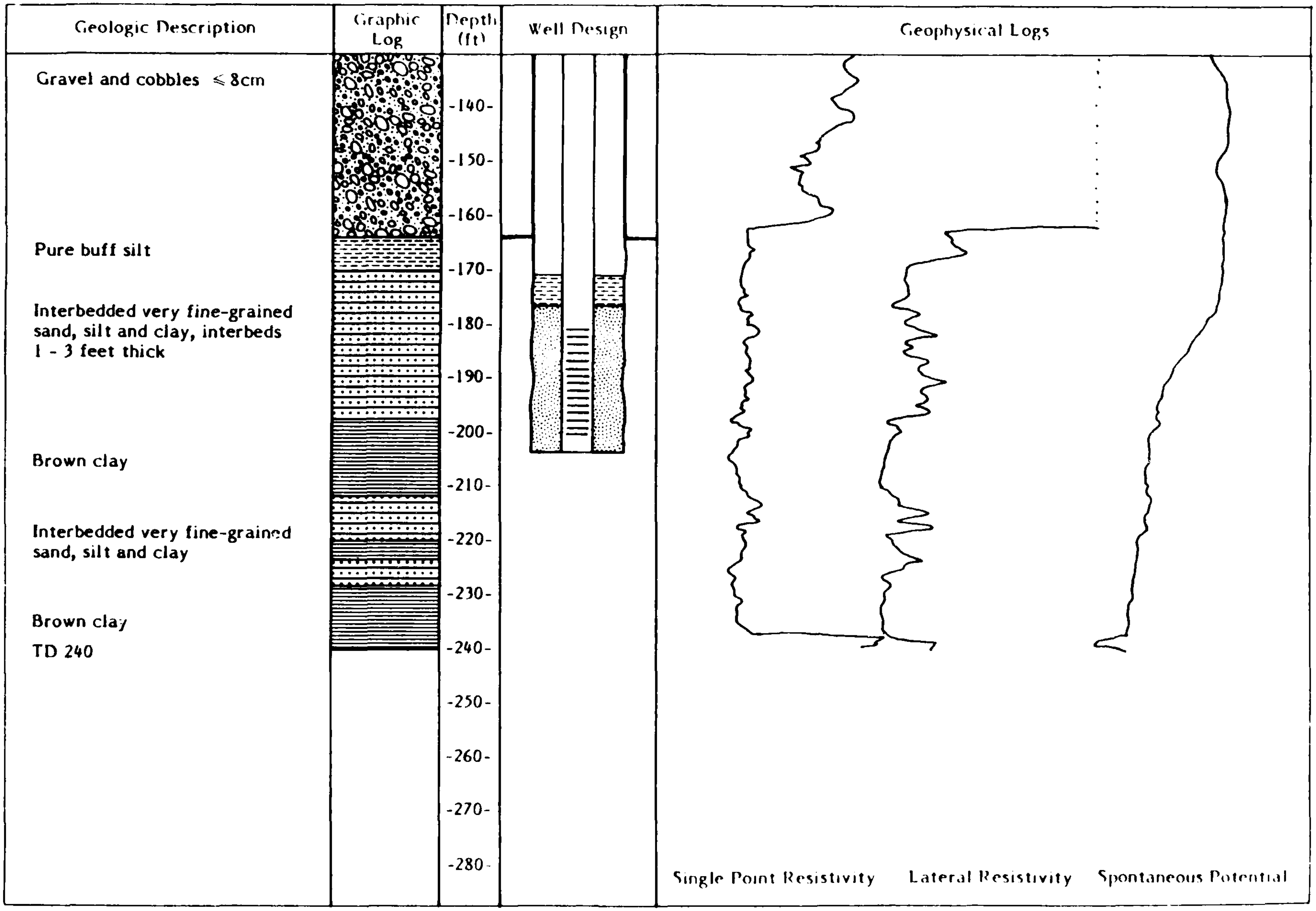
Logged By Napp

Checked By O'Gara

Date 9/4/86



MAFB-62



AV-F HW05

Well No. MAFB-63

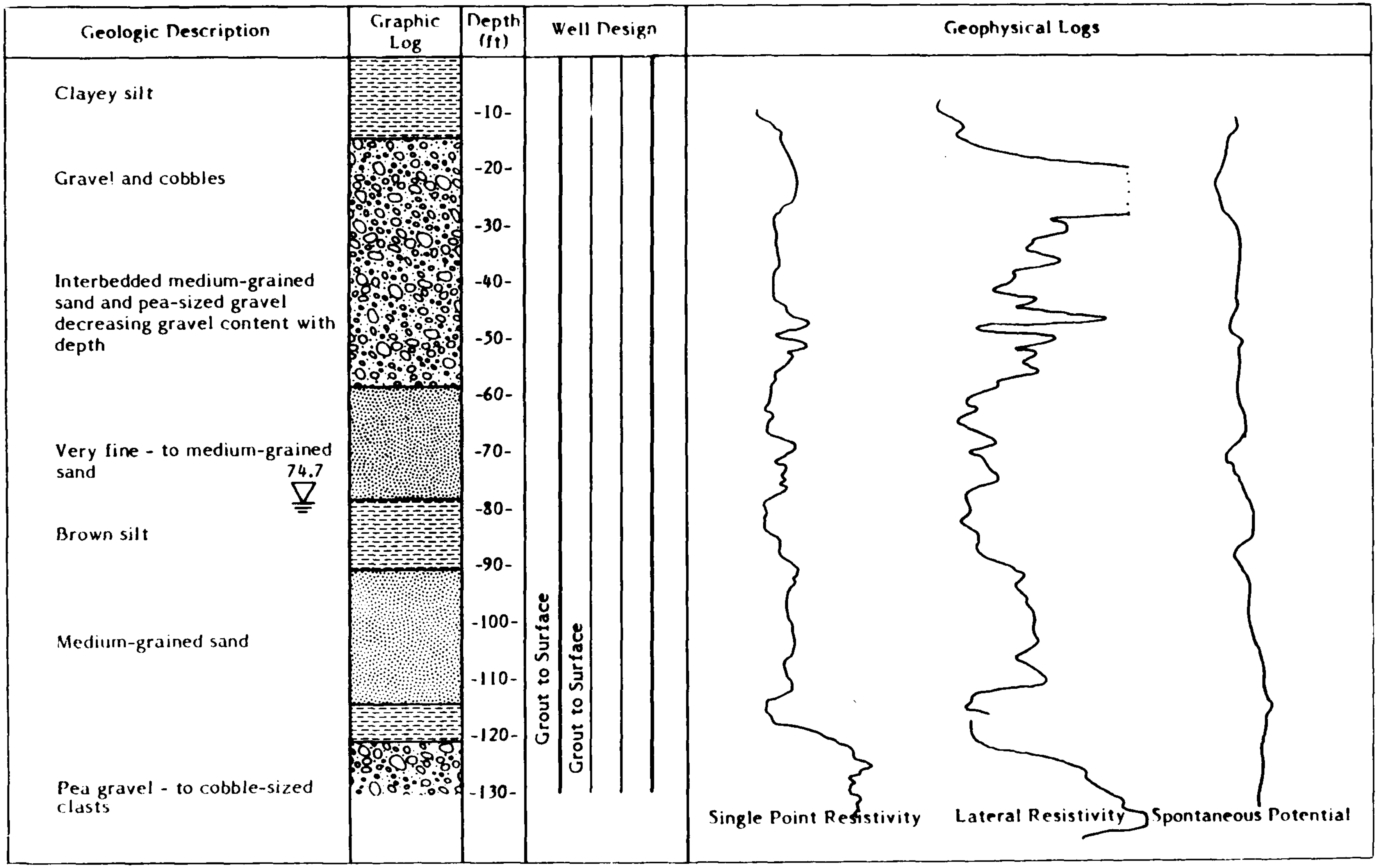
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Amber

Checked By O'Gara/Napp

Date 8/25/86



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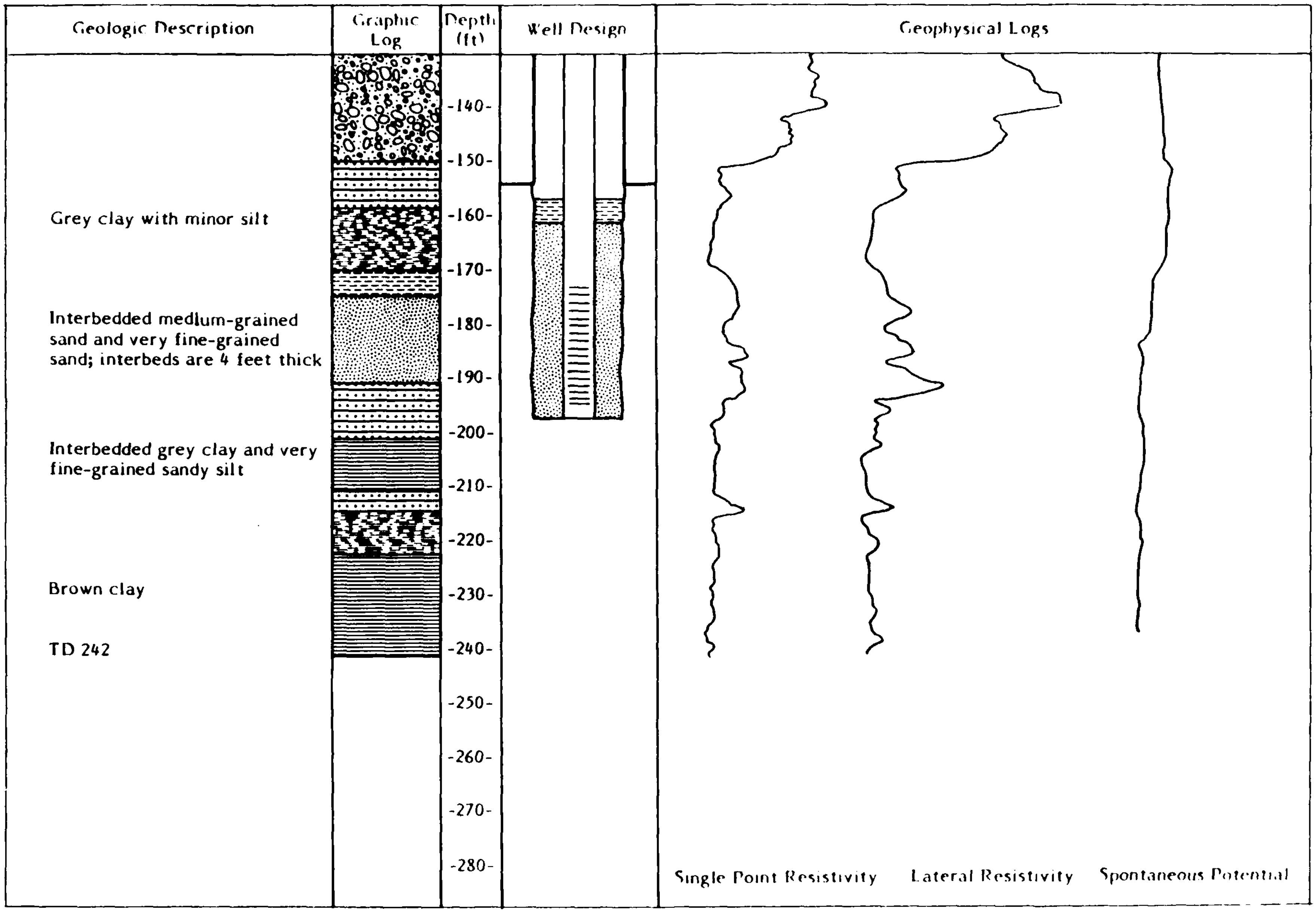


Geologic Description
Graphic Log
Depth (ft)
Well Design
Geophysical Logs
Grey clay with minor silt
Interbedded medium-grained sand and very fine-grained sand; interbeds are 4 feet thick
Interbedded grey clay and very fine-grained sandy silt
Brown clay
TD 242
-140-
-150-
-160-
-170-
-180-
-190-
-200-
-210-
-220-
-230-
-240-
-250-
-260-
-270-
-280-
Single Point Resistivity
Lateral Resistivity
Spontaneous Potential

Well No. MAFB-64

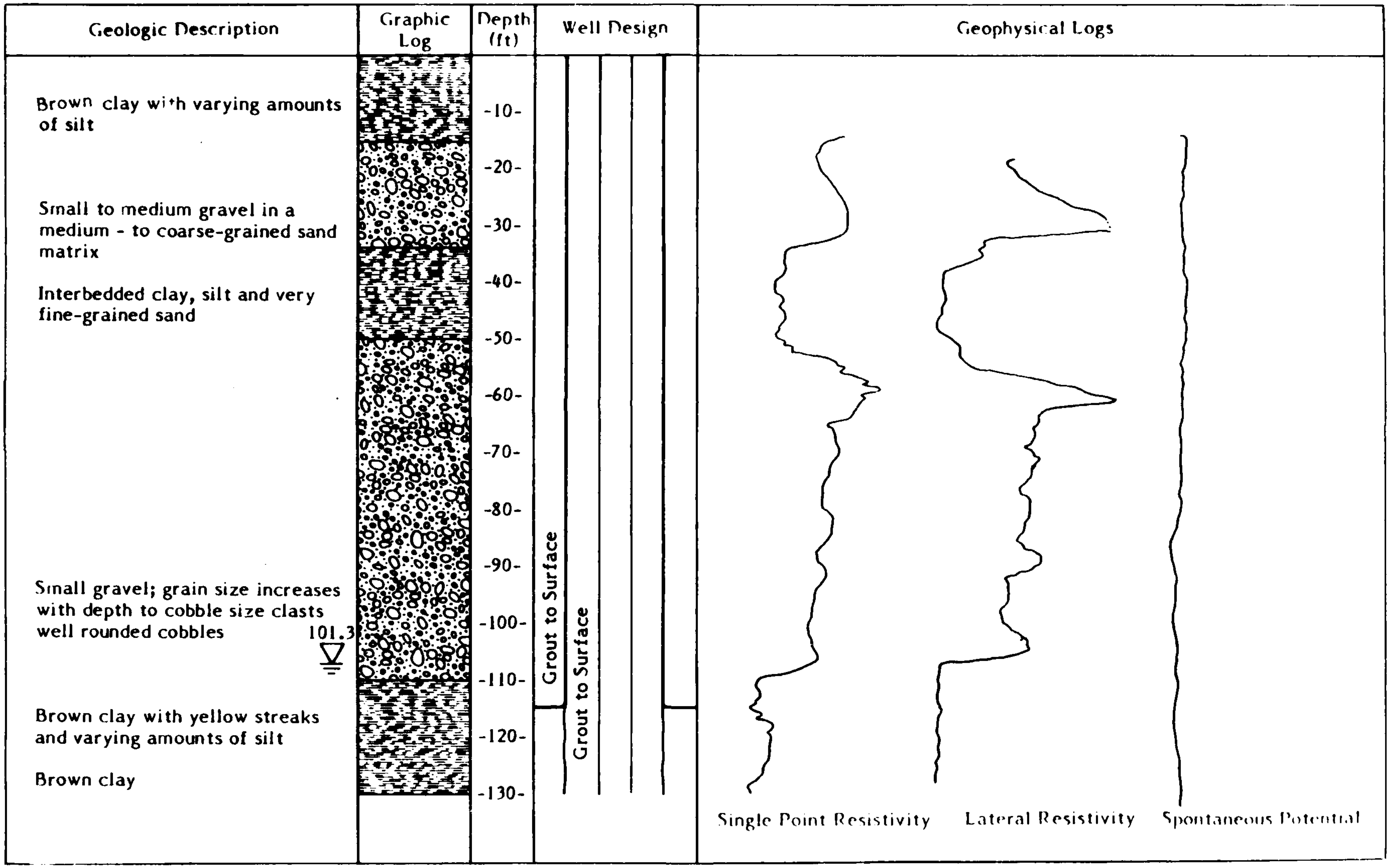
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

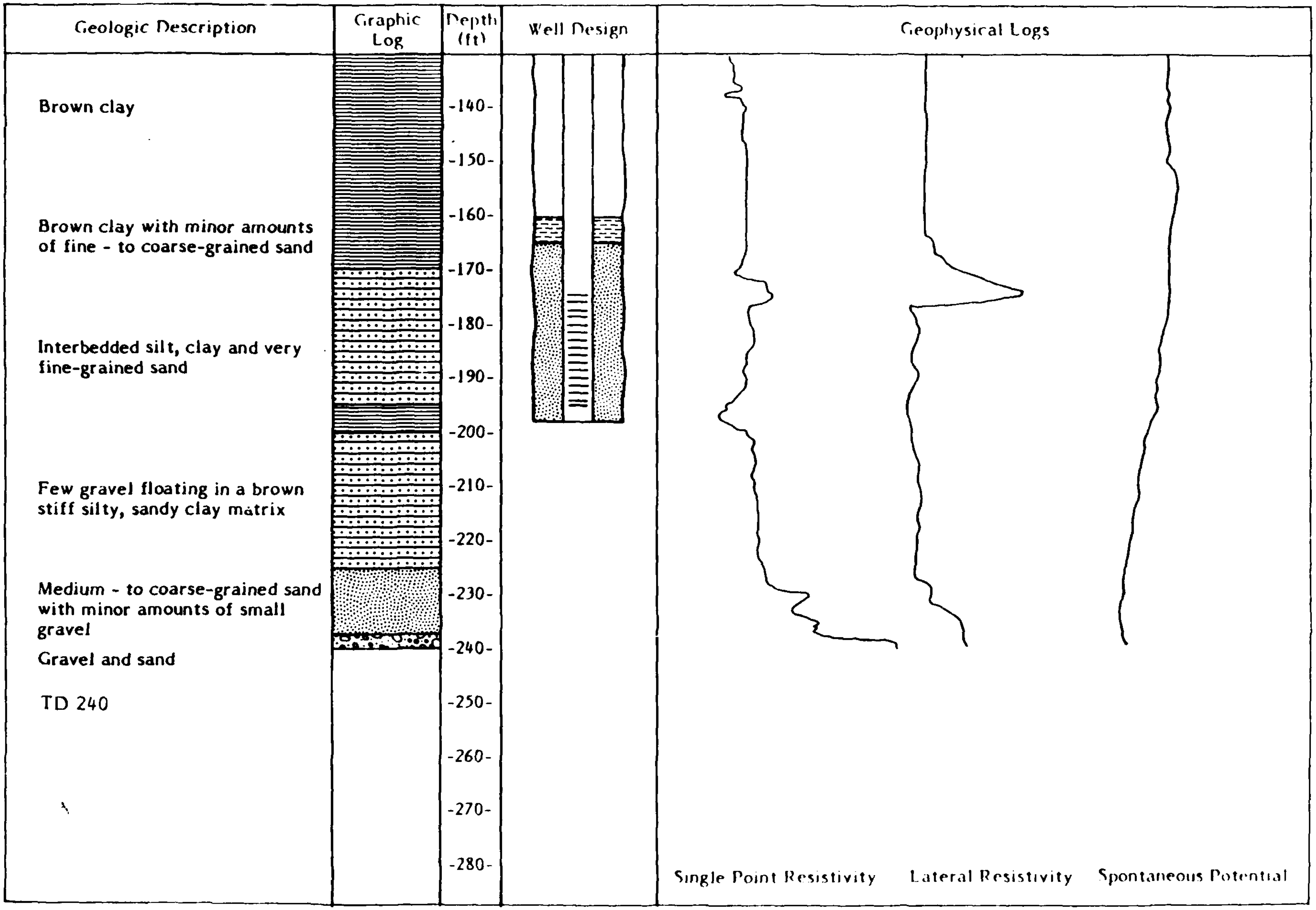
Logged By Napp

Checked By O'Gara

Date 9/12/86



MAFB-64


Geologic Description
Graphic Log
Depth (ft)
Well Design
Geophysical Logs
Brown clay
Brown clay with minor amounts of fine - to coarse-grained sand
Interbedded silt, clay and very fine-grained sand
Few gravel floating in a brown stiff silty, sandy clay matrix
Medium - to coarse-grained sand with minor amounts of small gravel
Gravel and sand
TD 240
-140-
-150-
-160-
-170-
-180-
-190-
-200-
-210-
-220-
-230-
-240-
-250-
-260-
-270-
-280-
Single Point Resistivity
Lateral Resistivity
Spontaneous Potential

Well No. MAFB-65

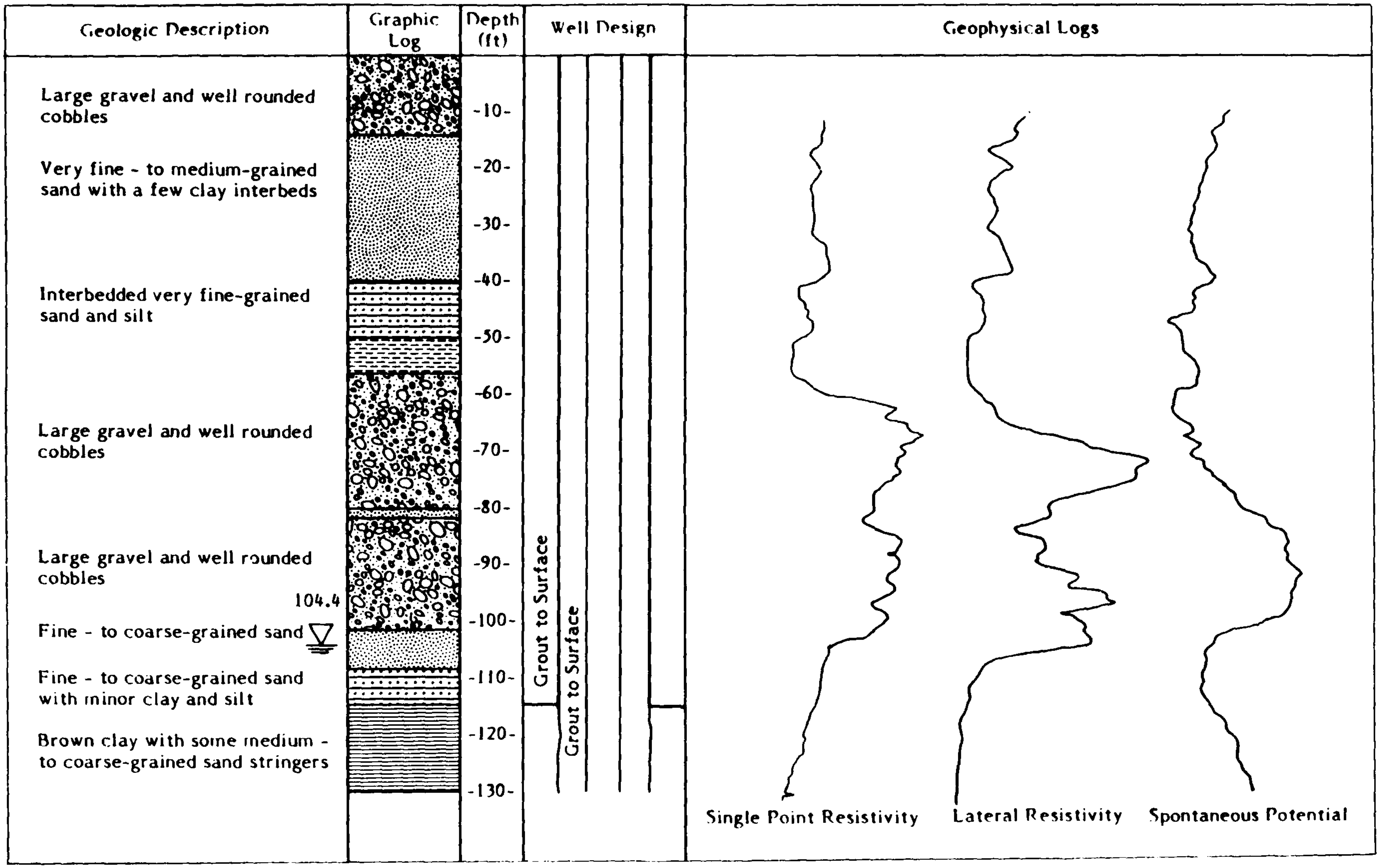
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

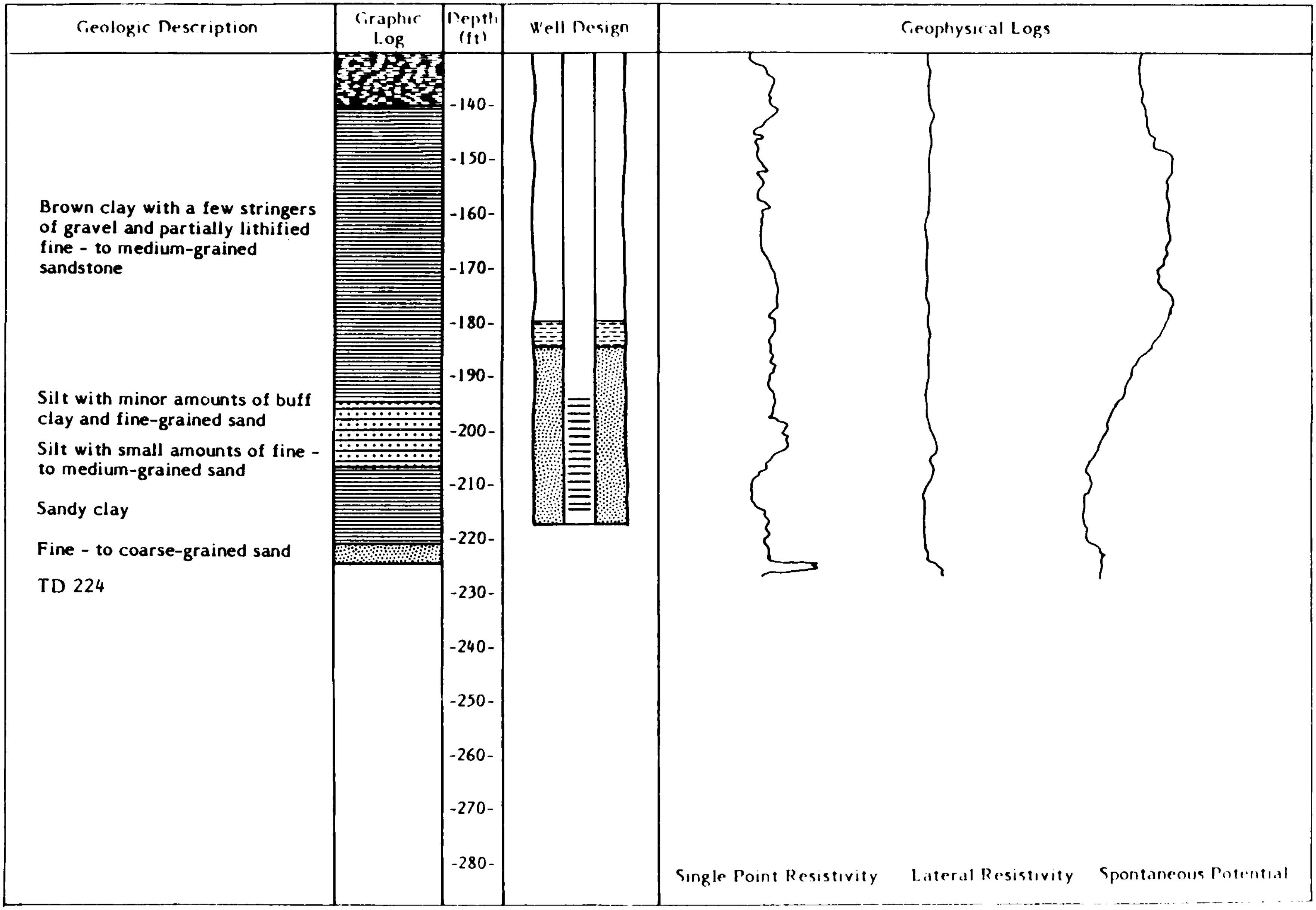
Logged By Napp

Checked By O'Gara

Date 9/12/86



MAFB-65



AV F HW95

Well No. MAFB-66

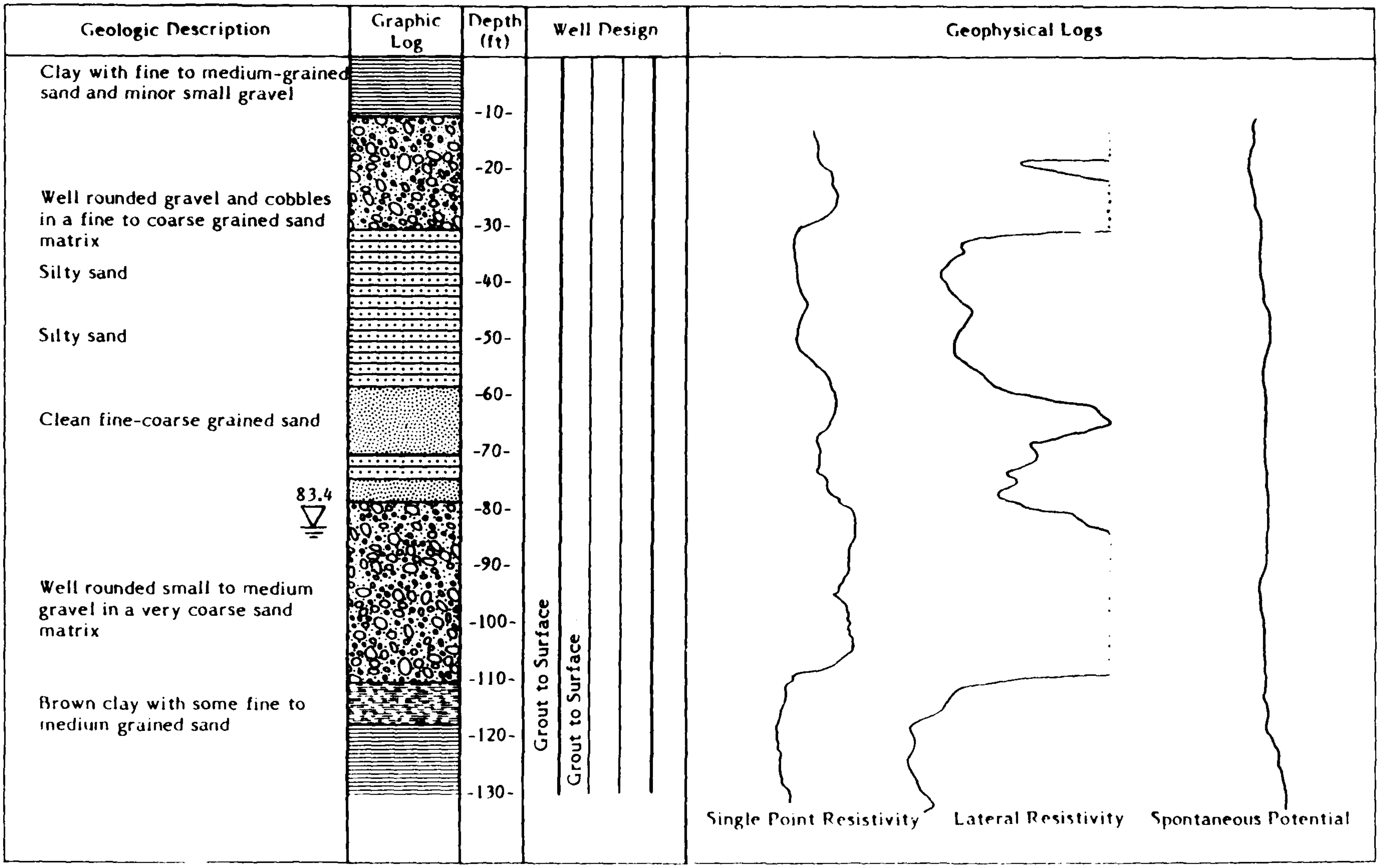
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

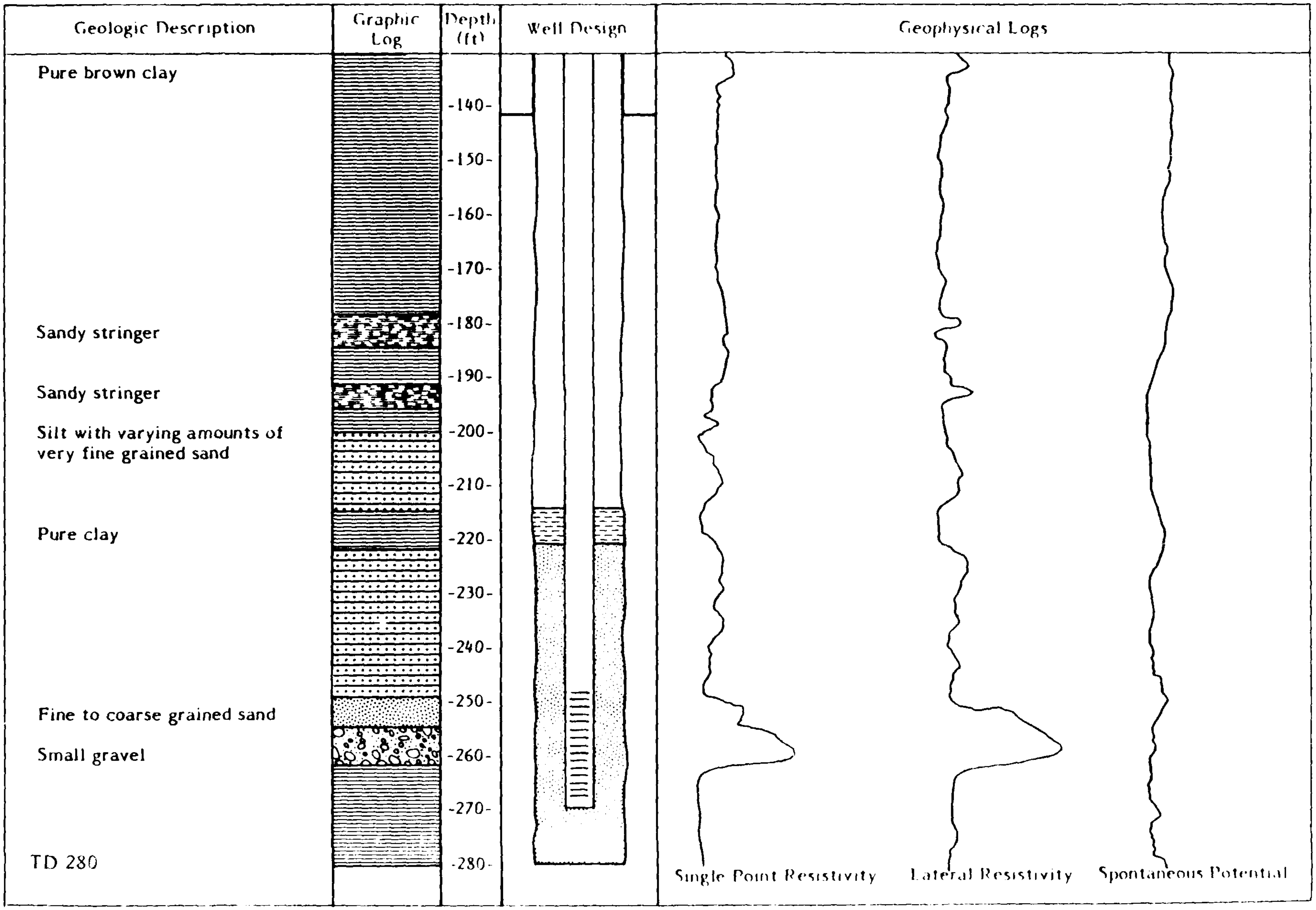
Logged By O'Gara

Checked By Napp

Date 9/18/86



MAFB-66



AV F HW05

Well No. MAFB-67

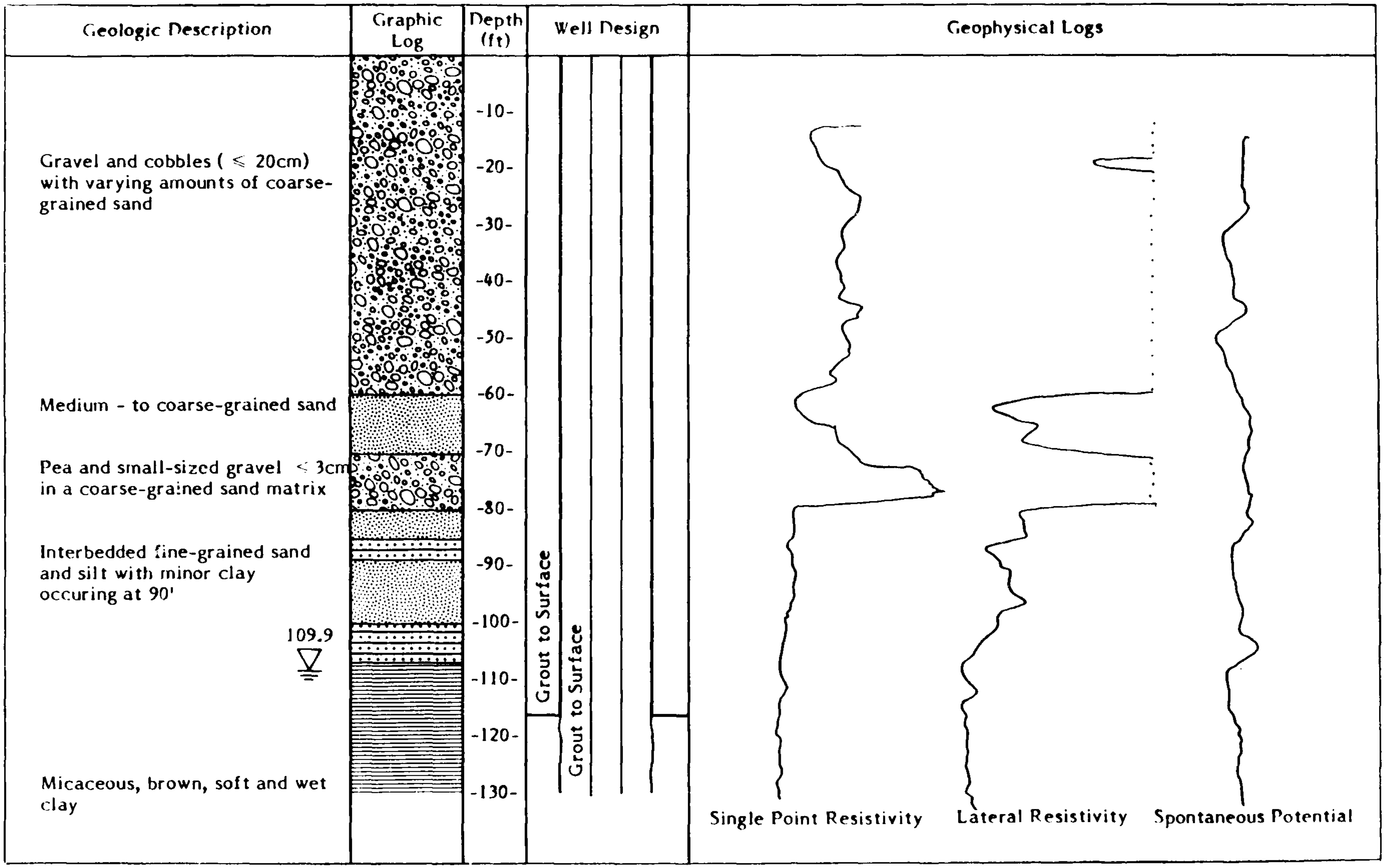
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

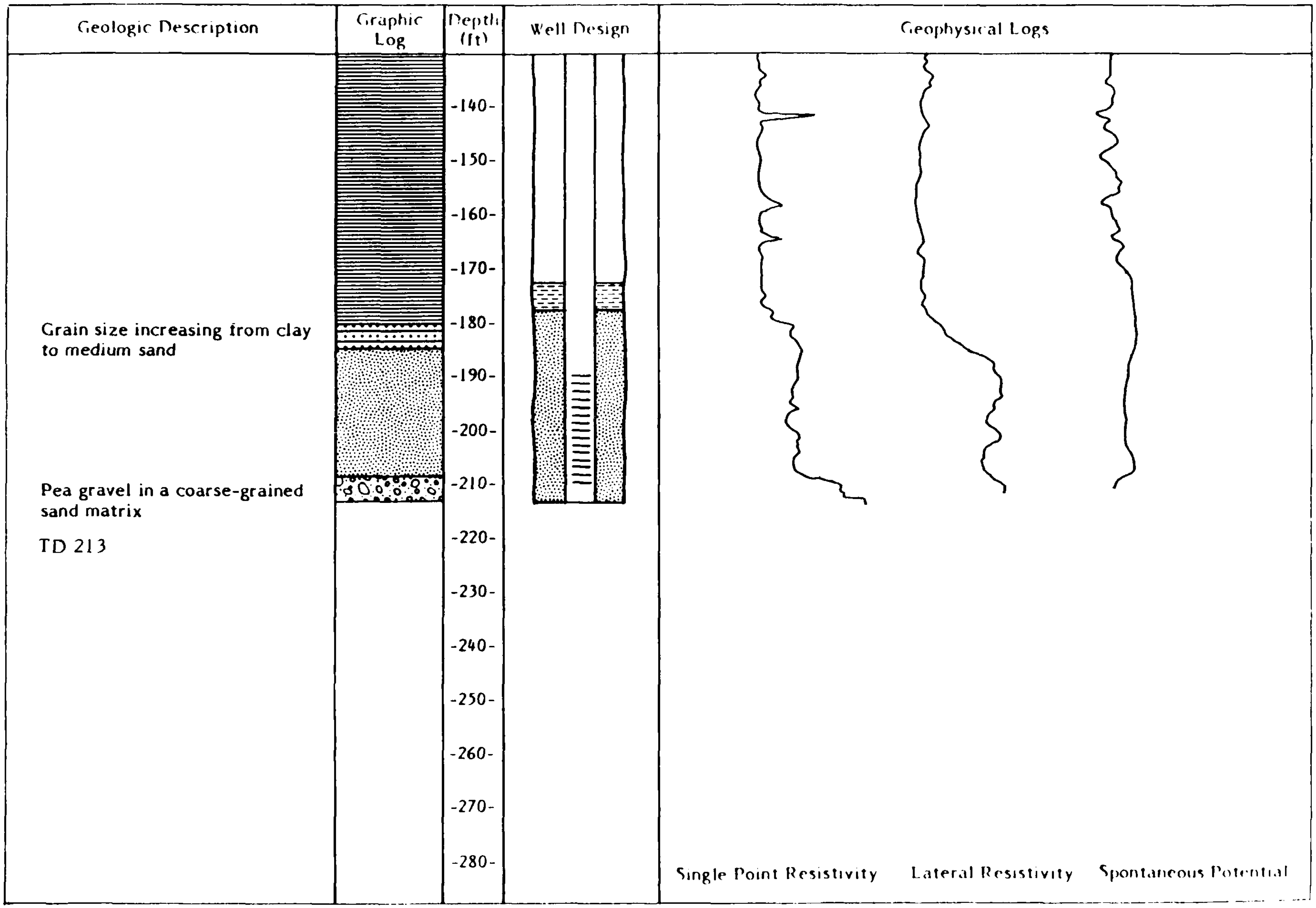
Logged By Napp

Checked By O'Gara

Date 10/1/86



MAFB-67



AV F HW05

Well No. MAFB-68

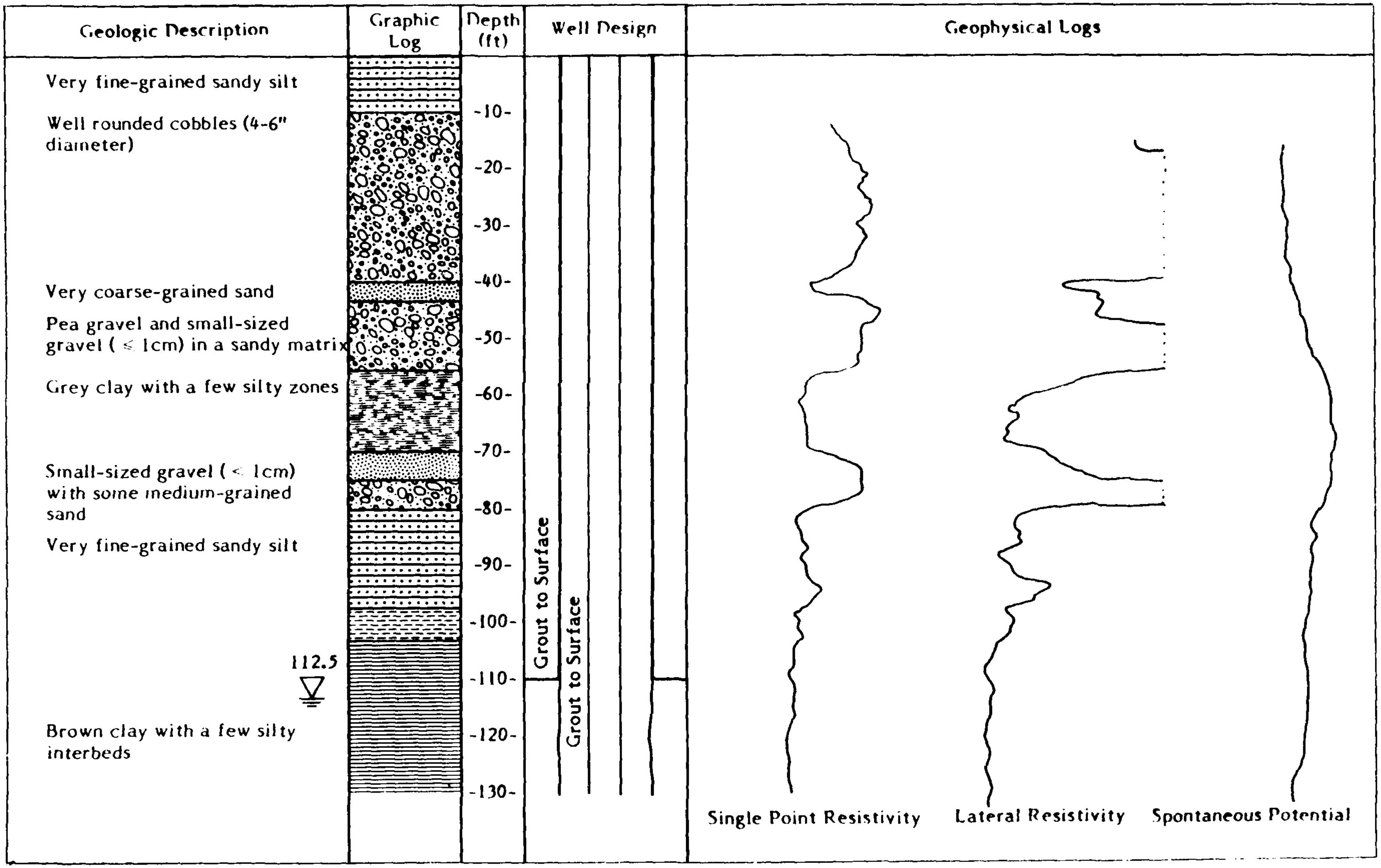
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

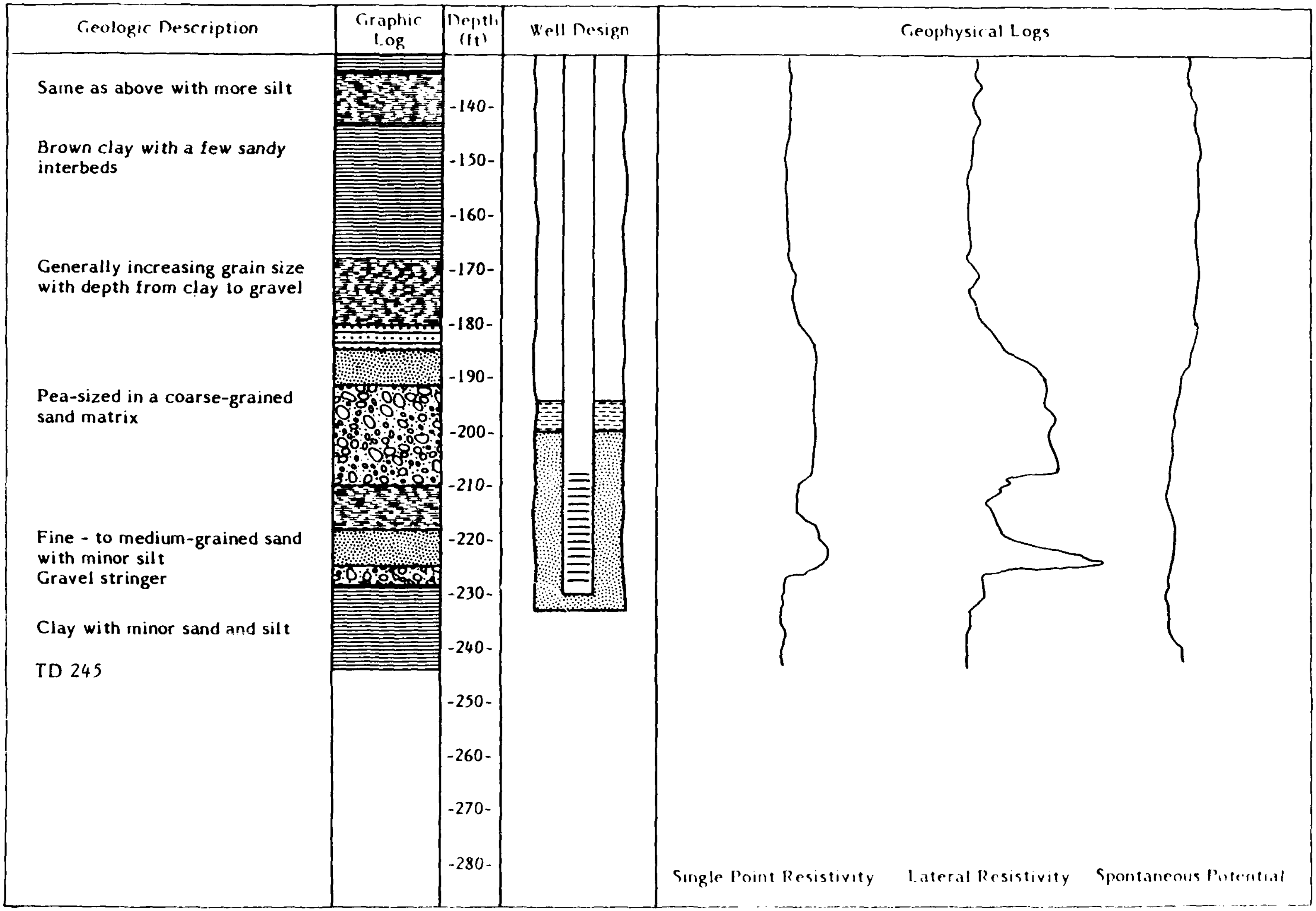
Logged By O'Gara

Checked By Napp

Date 9/27/86



MAFB-68



AV F HW05

Well No. MAFB-69

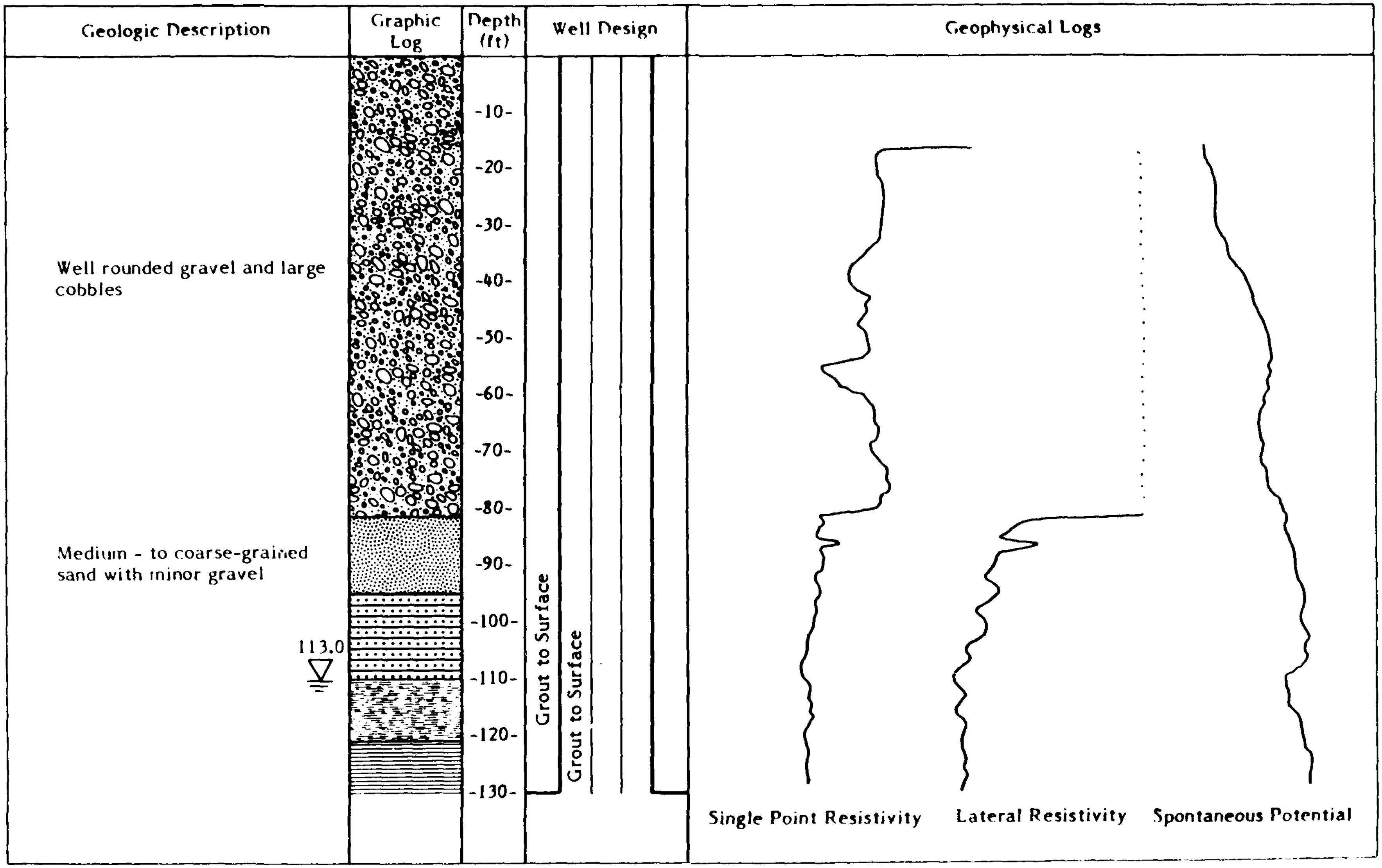
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

Checked By O'Gara

Date 10/5/86



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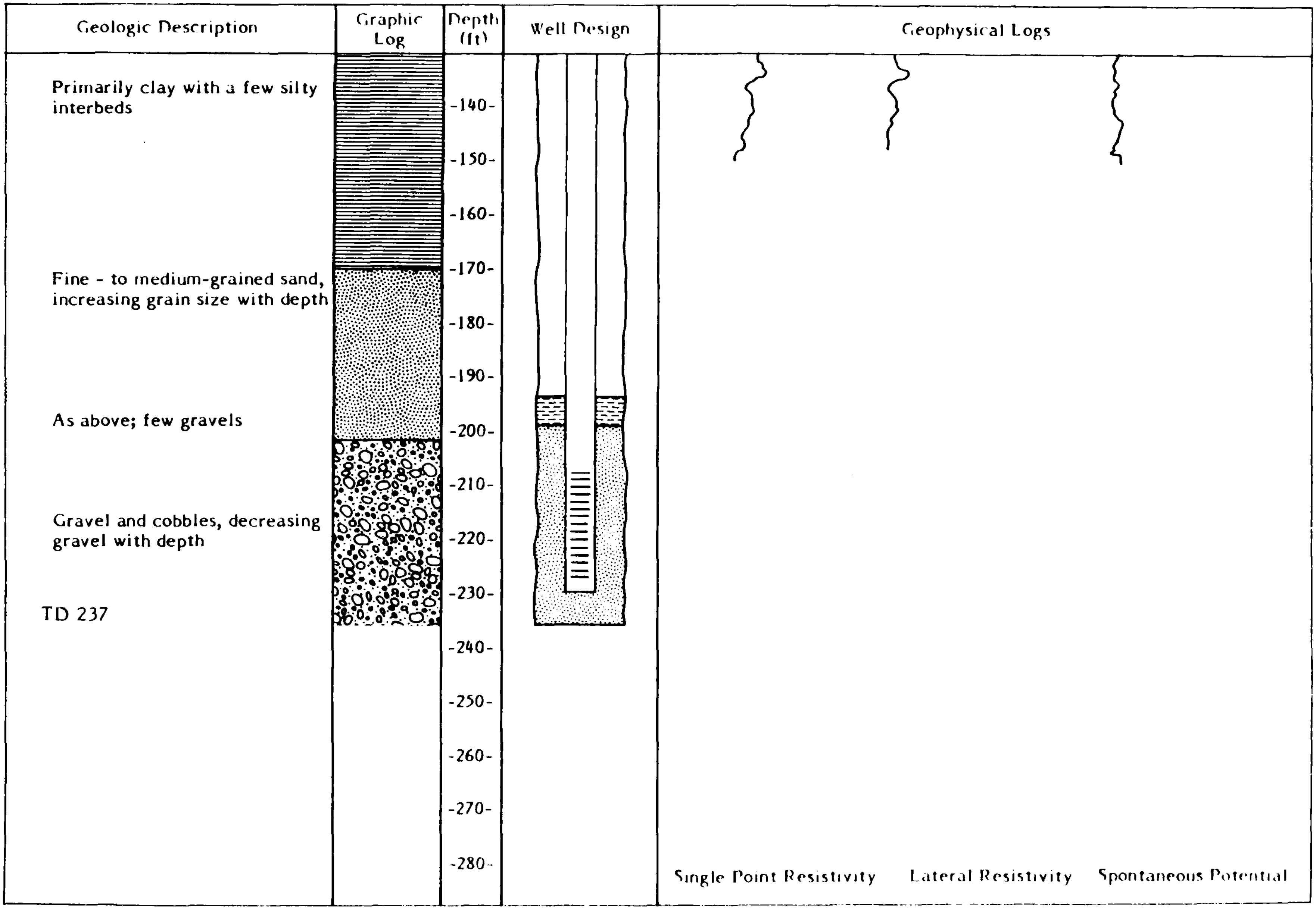

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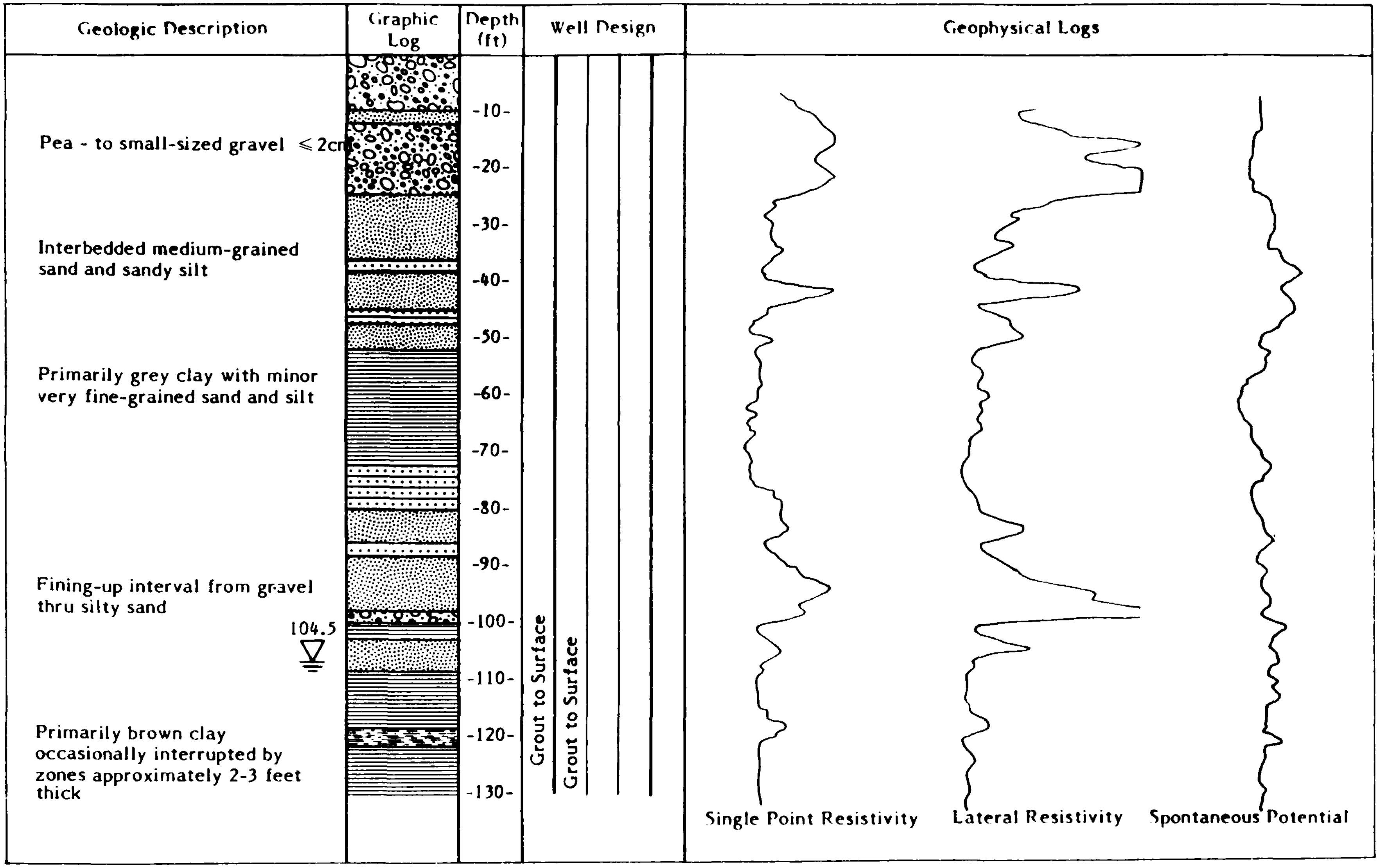
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

Checked By O'Gara

Date 10/2/86



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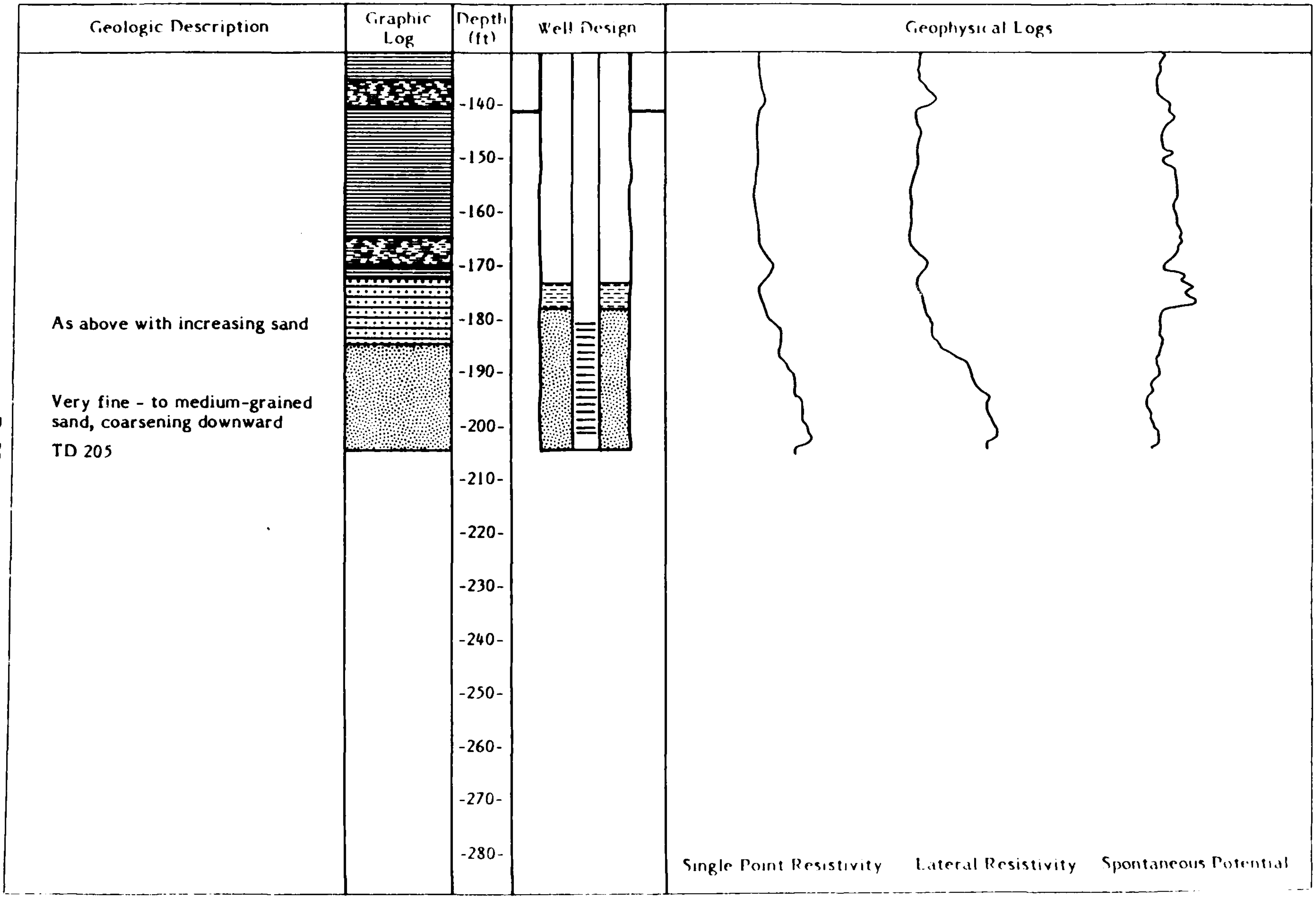


AV F HW05

Well No. MAFB-71

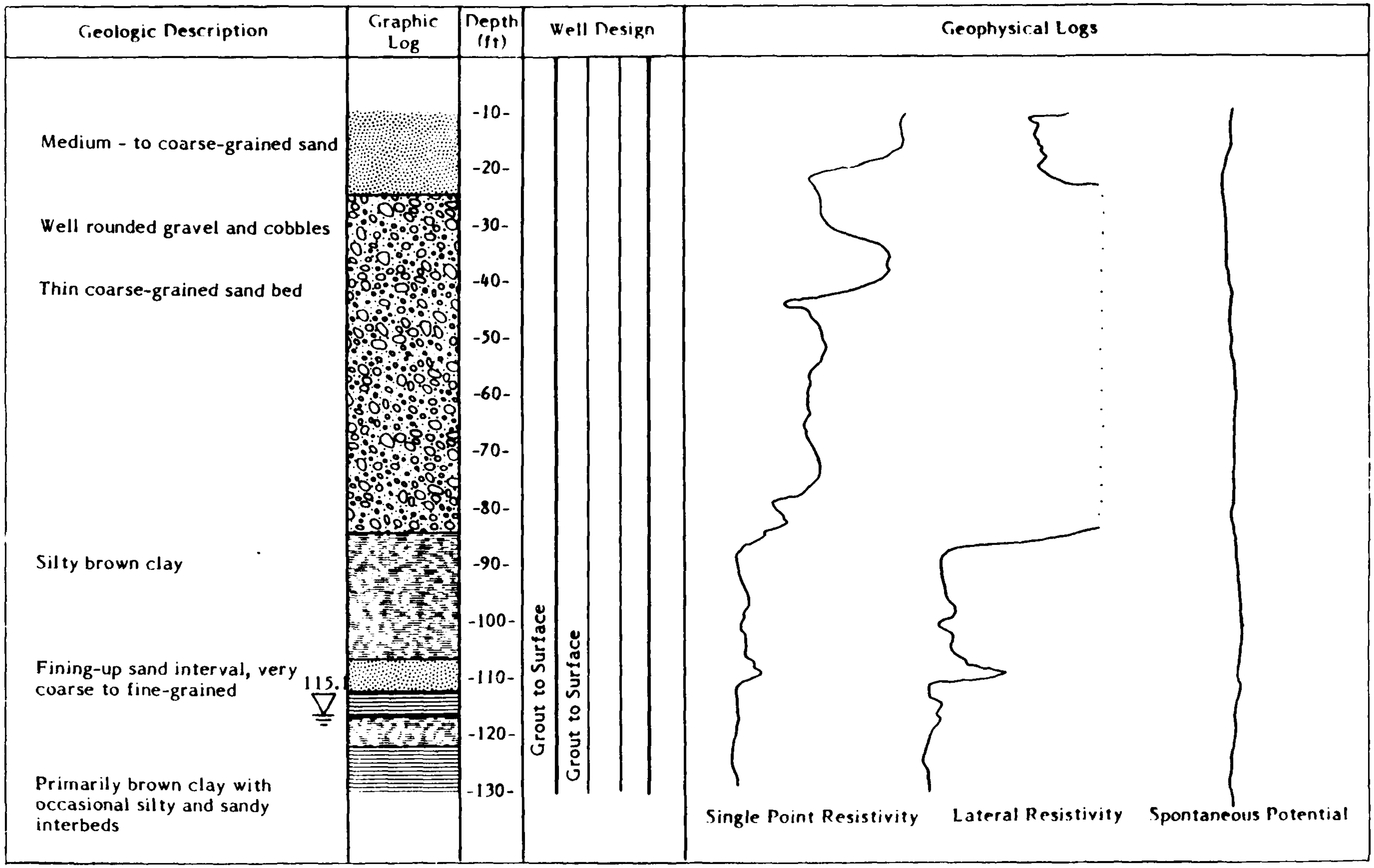
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

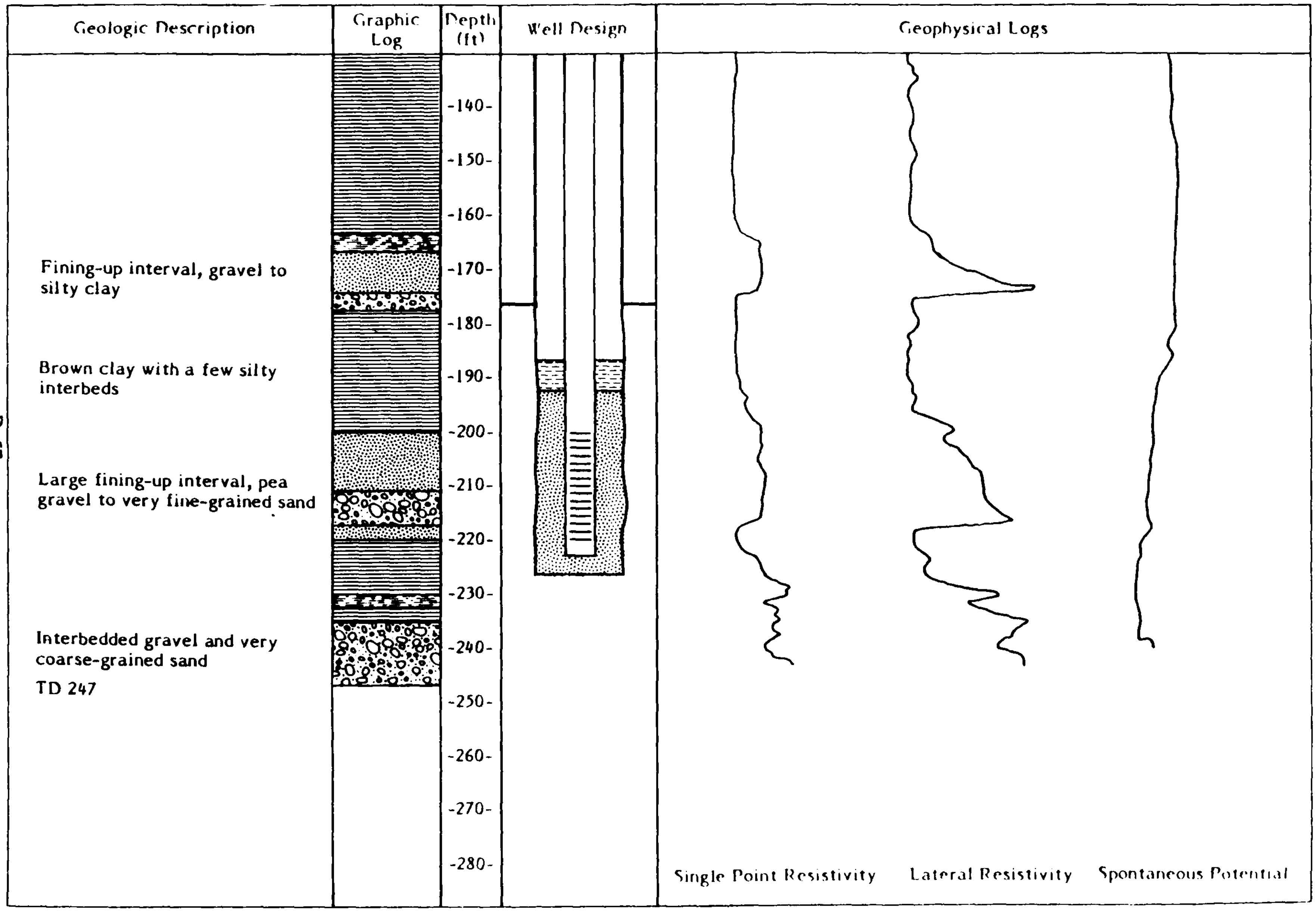
Logged By Napp

Checked By O'Gara

Date 10/6/86



MAFB-71


Geologic Description
Graphic Log
Depth (ft)
Well Design
Geophysical Logs
Fining-up interval, gravel to silty clay
Brown clay with a few silty interbeds
Large fining-up interval, pea gravel to very fine-grained sand
Interbedded gravel and very coarse-grained sand
TD 247
-140-
-150-
-160-
-170-
-180-
-190-
-200-
-210-
-220-
-230-
-240-
-250-
-260-
-270-
-280-
Single Point Resistivity
Lateral Resistivity
Spontaneous Potential

Well No. MAFB-72

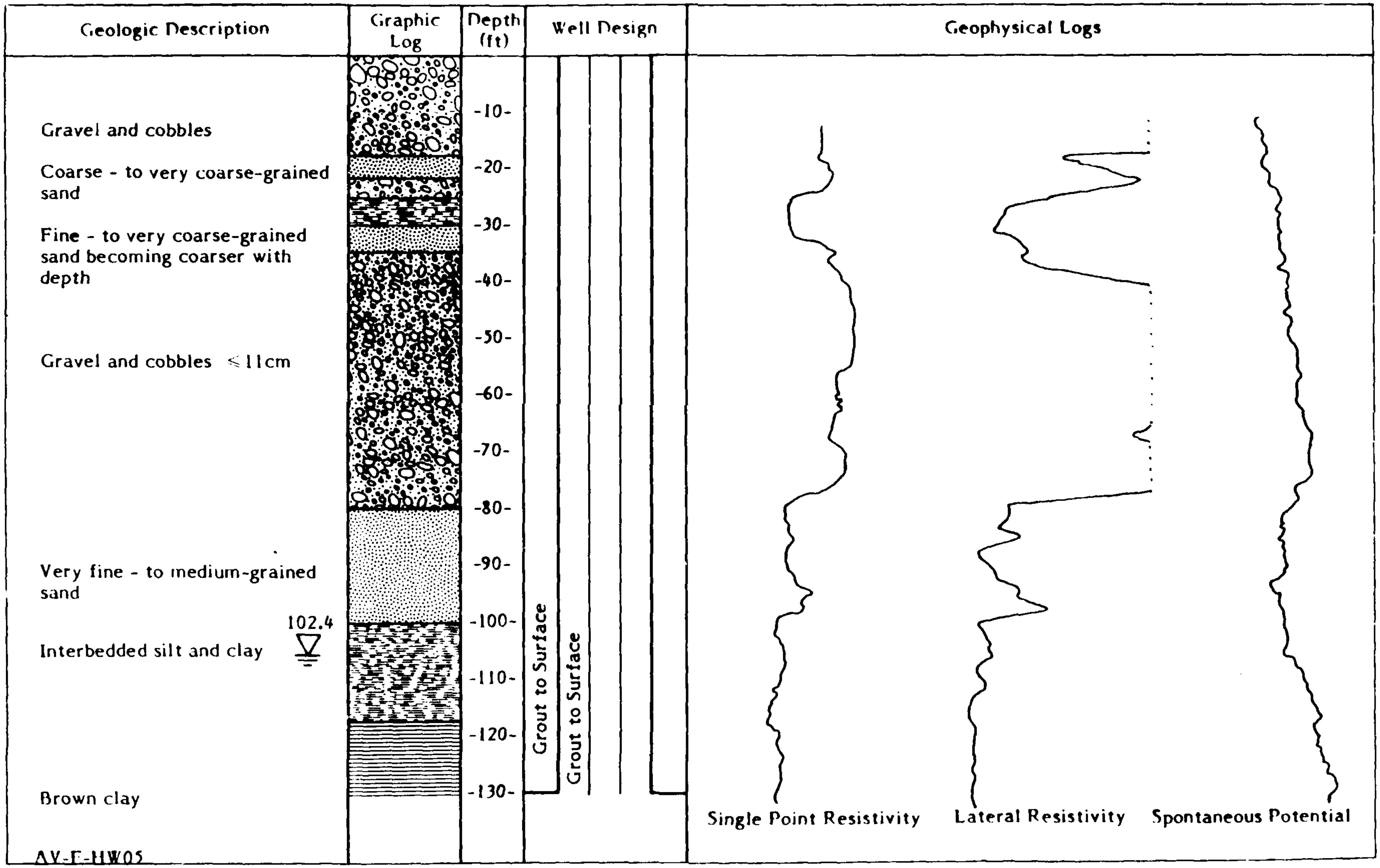
Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp

Checked By O'Gara

Date 10/9/86



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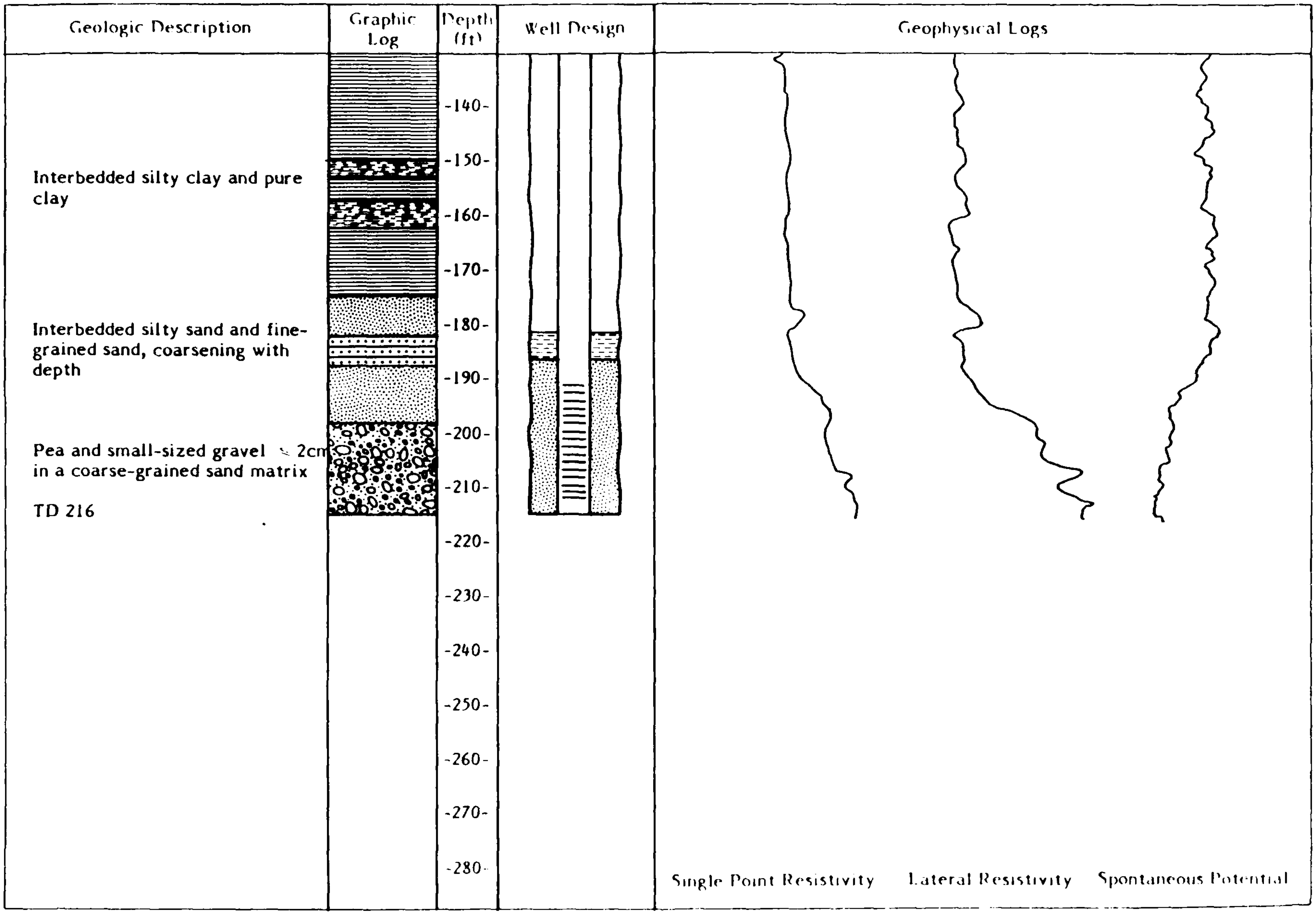

AV IT HW05

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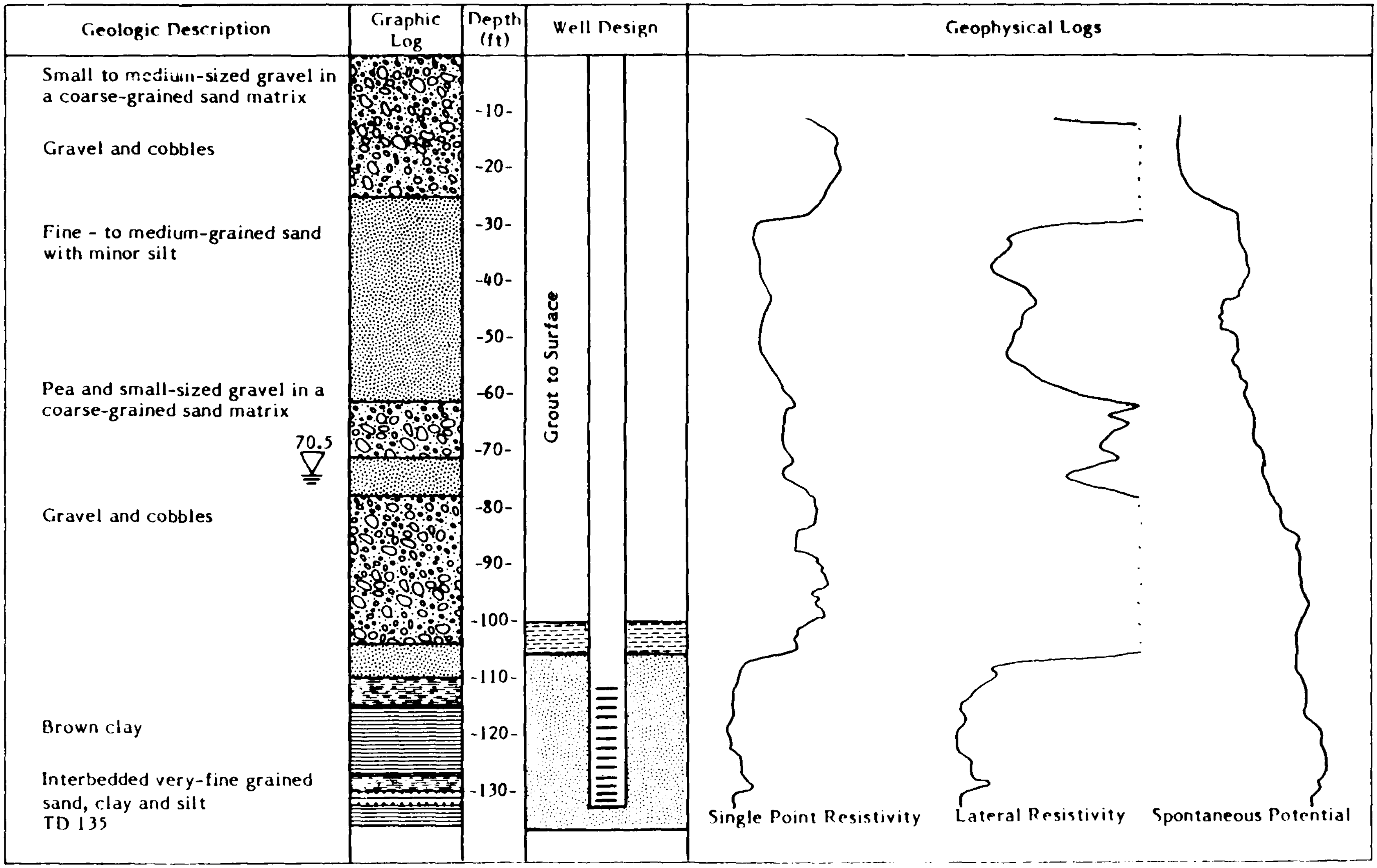
Logged By Thurston

Project Name Mather Stage III

Checked By Napp

Drilling Method Conventional Mud Rotary

Date 9/29/86



Note: There is no Well MAFB-74

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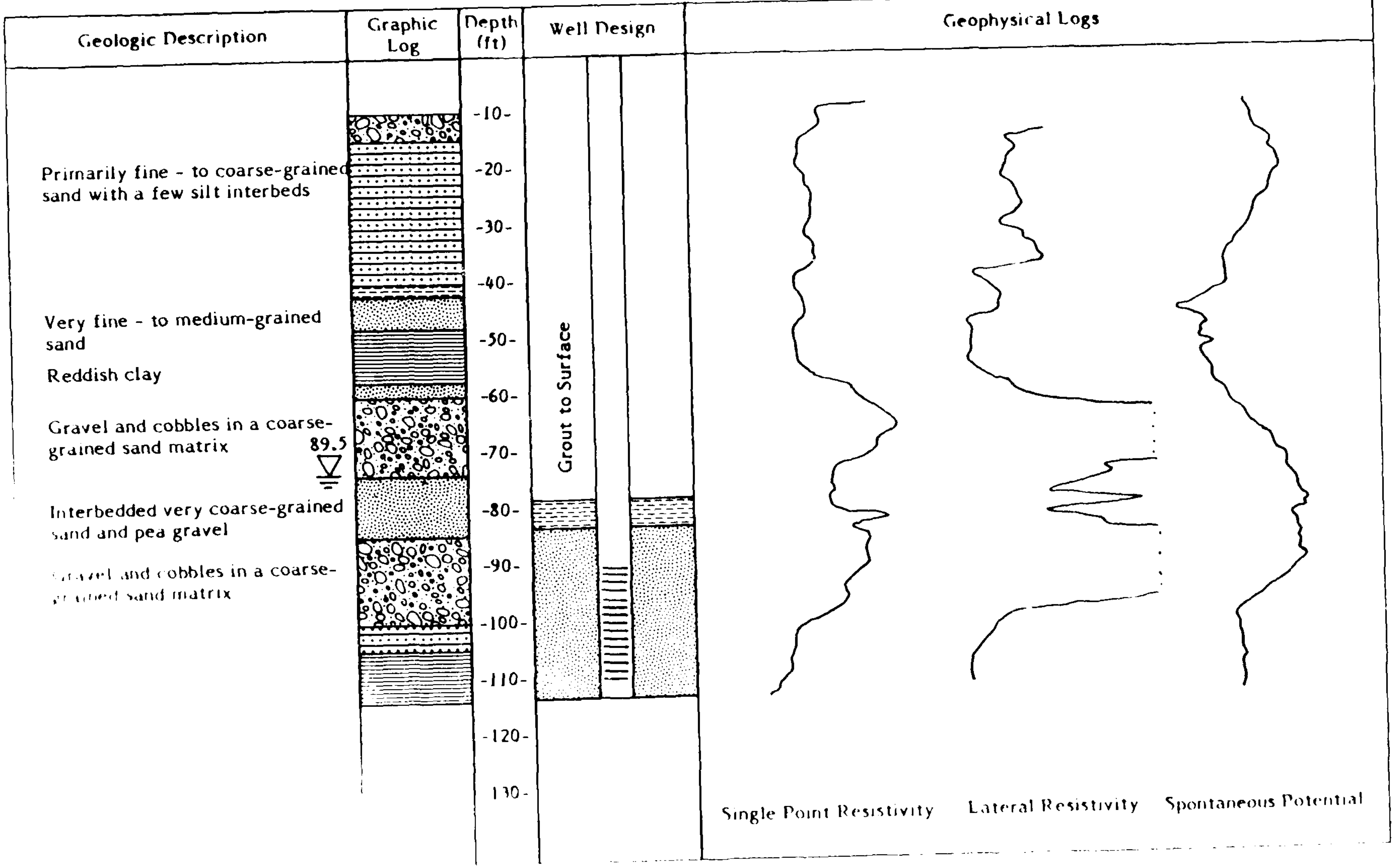
Project Name: Mather Stage III

Drilling Method: Conventional Mud Rotary

Logged By: O'Gara

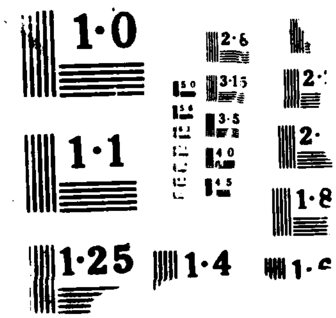
Checked By: Napp

Date: 9/30/86



AD-A194 900 INSTALLATION RESTORATION PROGRAM PHASE 2 CONFIRMATION/QUANTIFICATION STAGE 3(U) AEROVIRONMENT INC MONROVIA CA 05 FEB 88 AV-FR-86/596 4/10

UNCLASSIFIED F33615-83-D-4000 F/G 24/4 NL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1·25
1·4
2·8
3·15
3·5
4·0
4·5
5·0
1·8

Well No. MAFB-76

Project Name Mather Stage III

Drilling Method Conventional Mud Rotary

Logged By Napp/Herera

Checked By O'Gara

Date 10/10/86

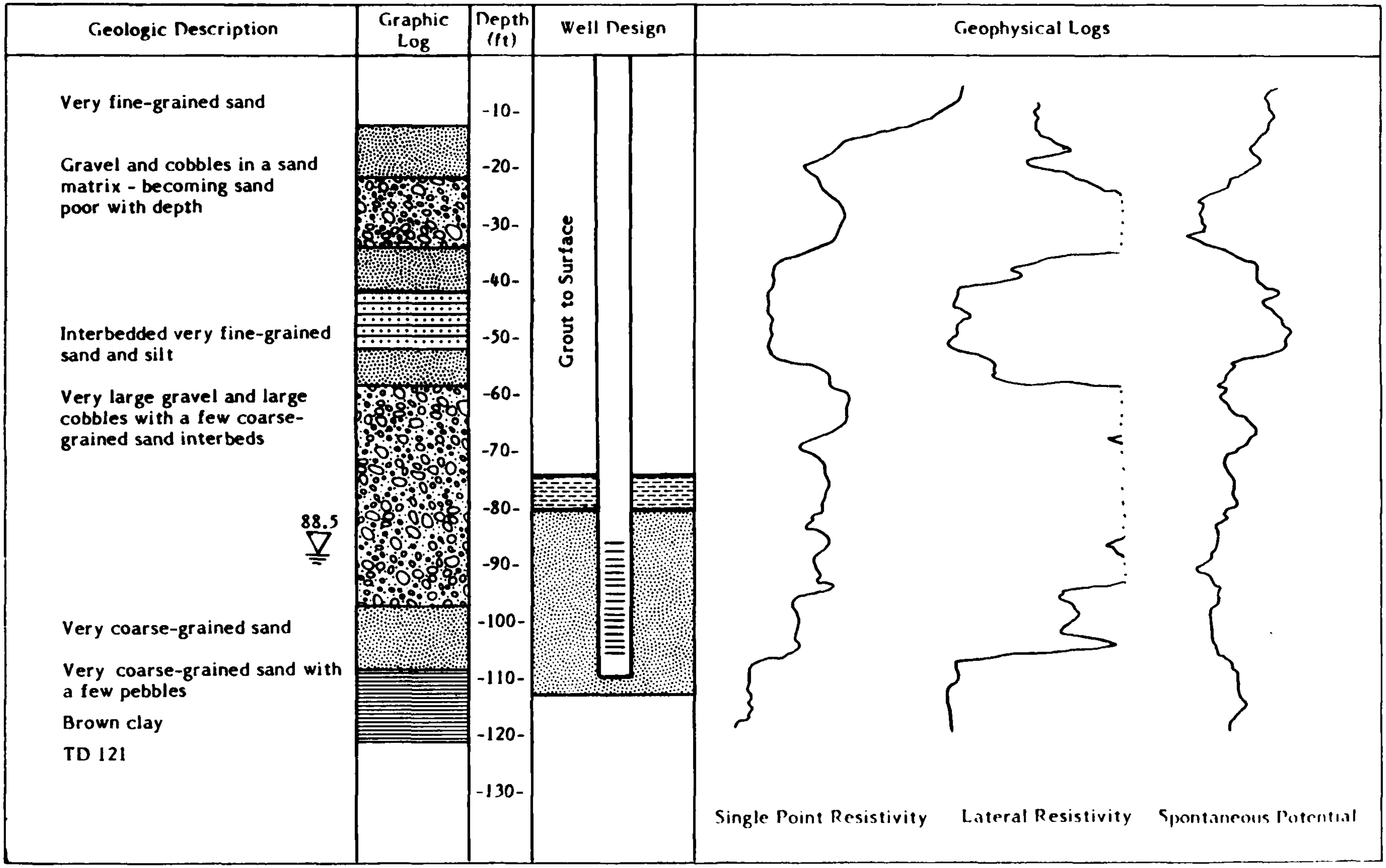

TABLE D-1. Well depths and screened intervals.

Shallow Wells

Well No.	Site	Total Depth in Ft. Below Ground Surface	Screened Interval (Ft. Below Ground Surface)
40	7100	124	92-112
41	7100	150	100-120
42	7100	133	90-110
43	7100	133	108-128
44	7100	110	60-80
45	7100	105	55-75
46	Jet Test Cell	116	70-90
50	ACW	130	100-120
51	ACW	170	105-125
52	ACW	140	105-125
53	ACW	181	157-177
54	ACW	144	110-130
47	West Ditch	108	75-95
48	West Ditch	133	70-90
49	(West Ditch) Commissary	122	99-119
73	NE Perimeter	135	112-132
75	NE Perimeter	114	91-111
76	NE Perimeter	121	87-107

TABLE D-1. (con't)

Deep Wells

Well No.	Site	Total Depth (ft)	Screened Interval (ft)	Depth to Bottom of Conductor (ft)	Depth to Bottom of Surface Casing (ft)
55	7100	250	225-245	126	--
56	7100	209	177-197	152	55
57	7100	200	177-197	156	55
58	7100	245	171-191	150	55
59	Jet Test Cell	240	160-180	131	55
67	ACW	213	190-210	117	--
68	ACW	245	207-227	110	--
69	ACW	237	207-227	130	--
70	ACW	205	183-203	142	--
71	ACW	247	200-220	177	--
72	ACW	216	192-212	130	--
60	West Ditch	245	175-195	164	55
61	West Ditch	230	184-204	165	--
62	West Ditch	240	181-201	165	--
63	West Ditch	242	175-195	155	--
66	NE Perimeter	280	247-267	142	--
65	NE Perimeter	224	195-215	115	--
64	NE Perimeter	240	175-195	115	--

APPENDIX E

Laboratory Procedures

E. LABORATORY CONSIDERATIONS

E.1 Laboratory Procedures

AeroVironment will send the original samples collected to Acurex Laboratory in Mountain View, California, for analysis. The AV field team will also send 10% of the splits collected in the field to USAFOEHL at Brooks AFB, Texas.

Acurex will be responsible for checking sample condition upon receipt, analyzing the samples, tracking them while in their possession, and reporting the results to AV. The following analyses will be performed on the Mather AFB samples:

VOC - Water (601/8020)
Petroleum Hydrocarbons - Water (3550/418.1)
Total Phenolics - Water (420.1)
Common Anions - Water (SM 429)
Metals and Minerals - Water (200.7)
Arsenic - Water (206.2)
Mercury - Water (245.1)
Selenium - Water (270.2)
TDS - Water (160.1)
Alkalinity - Water (SM 403)
Cyanide - Water (EPA 335.2)

The methods planned for these analyses are briefly outlined on Table E-1. Table E-2 shows detection limits, holding times and sample volume requirements.

Acurex is currently certified by the California Department of Health Services to conduct all of the analyses that the certification program covers. All work completed on the Mather AFB samples will be in accordance with applicable state certification procedures.

TABLE E-1. Analytical method description.

Volatile Organics(2)	-	Methods 601 and 8020. Will determine those compounds listed in the specific methods. Acurex will extract the samples by Purge and Trap for each analysis, and use a GC-Hall and GC-PID for Methods 601 and 8020, respectively.
Heavy Metals and Minerals(2)		Series 200 methods. EPA-600/4-79-020. Acurex will determine Ba, Cd, Ca, Cr, Fe, Pb, Mn, Mg, K, Ag, Na. All analyses will by inductively coupled plasma emission spectroscopy.
Petroleum Hydrocarbons(2)	-	EPA Method 418.1. Similar to oil and grease analysis, but involves a step to remove animal and vegetable-derived oils and fats. Only petroleum mineral oil and greases are quantitated, by infrared spectrophotometry. Soil samples will be extracted prior to analysis using Method 3550.
Alkalinity(4)	-	Includes carbonate, bicarbonate and hydroxide alkalinity and total hardness. Analysis will be by titration.
Total Phenolics(2)	-	EPA Method 420.1. Will determine total phenolic content; method does not differentiate between different substituted phenols. Phenols are reacted with a color-forming agent and quantitated colorimetrically.
Common Anions(4)	-	Includes chloride, sulfate, nitrate bromide, fluoride nitrite and phosphate. Analysis will be by ion chromatography.
Total Dissolved Solids	-	Method 160.1. The laboratory will gravimetrically analyze all residue which passes through the filters.
Arsenic(2)	-	Method 206.2. Analysis will be done by graphite furnace atomic absorption.
Mercury(2)	-	Method 245.1. Analysis will be done by cold vapor atomic absorption.

TABLE E-1. continued.

Selenium[2]	-	Method 270.2. Analysis will be done by graphite furnace atomic absorption.
Cyanide[2]	-	Method 335.2. Analysis will be done by UV visible spectroscopy.

(1)Methods for Organic Chemical Analysis of Municipal and Industrial Water, U.S. EPA, Federal Register Vol. 29, 26 October 1984.

(2)Methods for Chemical Analysis of Water and Wastes, U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati OH 45268, EPA 600/4-79-020.

(3)Test Methods for Evaluating Solid Waste, U.S. EPA, Office of Solid Waste Management and Emergency Responses, Washington, DC 20460, July 1982, 2nd Edition.

(4)Standard Methods for the Examination of Water and Wastewater, American Public Health Association, 1015 Fifteenth Street NW., Washington, DC 20005, 16th Edition.

TABLE E-2. Analytical summary.

Parameter	Method	Description	Method Detection Limit (MDL)	Maximum Holding Time	Preservation	Sample Container	2nd Column Confirmation
Volatile Organics	EPA 601	Purgeable Halocarbons by Hall/GC	As specified in methods	14 days	Cool to 4°C	40 ml glass	Analyte > MDL
	EPA 8020	Aromatic volatile organics by PID/GC		7 days	Cool to 4°C	40 ml glass	Analyte > MDL
Petroleum Hydrocarbons	EPA 3550 EPA 418.1	Total petroleum hydrocarbon compounds IR method	1 mg/L	28 days	H_2SO_4 to pH < 2 Cool to 4°C	1 L glass	
Total Phenolics	EPA 420.1	Total phenolic compound content, colorimetric method	5 µg/L	28 days	H_2SO_4 to pH < 2 Cool to 4°C	1 L glass	
Common Anions	SM 429	F^-, Cl^-, NO_2^{2-}, PO_4^{3-}, Br^-, NO_3^-, SO_4^{2-} by ion chromatography	As specified in method	Cl, F, Br, SO_4: 28 days, NO_2, NO_3, PO_4: 48 hrs	Cool to 4°C	1 L HDPE	
Metals & Minerals	EPA 200.7	Ba, Cd, Ca, Cr, Fe, Pb, Mg, Mn, Ag, Na, K by ICP	See Appendix A Page 20	6 months	HNO_3 to pH < 2 Cool to 4°C	1 L HDPE	
Arsenic	EPA 206.2	As by graphite furnace AAS	0.001 mg/L	6 months	HNO_3 to pH < 2 Cool to 4°C	1 L HDPE (with Hg, Se)	
Mercury	EPA 245.1	Hg by cold vapor AAS	0.0002 mg/L	28 days	HNO_3 to pH < 2 Cool to 4°C	1 L HDPE (with As, Se)	
Selenium	EPA 270.2	Se by graphite furnace AAS	0.002 mg/L	6 months	HNO_3 to pH < 2 Cool to 4°C	1 L HDPE (with As, Hg)	
TDS	EPA 160.1	Total filterable	10 mg/L	48 hours	Cool to 4°C	1 L HDPE residue by gravimetry	
Alkalinity	SM 403	Carbonate, bicarbonate and hydroxide alkalinity	N/A	14 days	Cool to 4°C	1 L HDPE (with TDS)	
Cyanide	EPA 335.2	CN^- analysis by UV visible spectroscopy	.01 mg/L	30 days	NaOH to pH > 12 Cool to 4°C	1 L HDPE	

QUALITY ASSURANCE PLAN

FOR

ANALYSIS OF MATHER AIR FORCE BASE SAMPLES

For

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, California 91016

By

Acurex Corporation
Environmental Systems Division
485 Clyde Avenue
P. O. Box 7044
Mountain View, California 94039

1. INTRODUCTION

The purpose of this Quality Assurance Plan is to describe the procedures that are used to assure the quality of organic and inorganic analyses of water and soil samples collected by AeroVironment at Mather Air Force Base.

QUALITY ASSURANCE PLAN

FOR

ANALYSIS OF MATHER AIR FORCE BASE SAMPLES

Approved by:

Acurex Corporation Project Manager	Jan Ehmann Jan Ehmann, Ph.D.	12/12/86 Date
Acurex Corporation Environmental Systems Division Quality Assurance Manager	David R. Taylor David R. Taylor, Ph.D.	12/11/86 Date
AeroVironment, Inc. Project Manager	Douglas B. Taylor, P.E.	1/6/87 Date
AeroVironment, Inc. Quality Assurance Manager	Keith J. Pettus Keith J. Pettus	1/6/87 Date

CONTENTS

Personnel Receiving Copies of Approved Quality Assurance Plan

Project Responsibility	Name
Project Manager	Jan Ehmann
ESD QA Manager	David R. Taylor
Project Chemist	Greg Nicoll
Sample Control Custodian	Efren Sablan
Metal Analyses	Patrick M. Hirata
General Analyses	J. Romeo Milanes
GC Analyses	Sarah Schoen
GC/MS Analyses	Richard Scott
AeroVironment Project Manager	Douglas B. Taylor
AeroVironment QA Manager	Keith J. Pettus
AeroVironment Project Chemist	Chris Lovdahl

2.3 Project Description

The purpose of this project is to provide quantitative organic and inorganic analyses of water and soil samples collected by AeroVironment at Mather Air Force Base. Volatile organics, pesticides, metals, anions, and other parameters will be measured. Gas chromatography will be employed for pesticides and volatile organic determinations. Gas chromatography/mass spectroscopy may be employed for confirmation of gas chromatographic analyses. Metals will be determined by inductively-coupled argon plasma emission spectrometry and atomic absorption spectrometry. Ion chromatography will be used for anion analyses.

2.4 Project Organization and Responsibility

The Project Manager is Dr. Jan Ehmann, who will manage the Acurex team and interface with the AeroVironment project manager. The QA Manager for this project is Dr. David Taylor, who will approve procedures and review quality assurance data. The project chemist is Greg Nicoll, who has the overall technical responsibility. In addition, Mr. Nicoll will coordinate shipment and analysis schedules with AeroVironment field and technical personnel. The sample custodian, who is responsible for receipt and custody of all samples, is Efren Sablan. Mary Colburn will be responsible for all inductively coupled argon plasma spectrometric analyses. Patrick Hirata will be responsible for all atomic absorption analyses. J. Romeo Milanes will be responsible for all general chemical analyses excluding atomic absorption spectrophotometry. Dr. Sarah Schoen will be responsible for all gas chromatographic analyses. Richard Scott will be responsible for all mass spectrometric analyses.

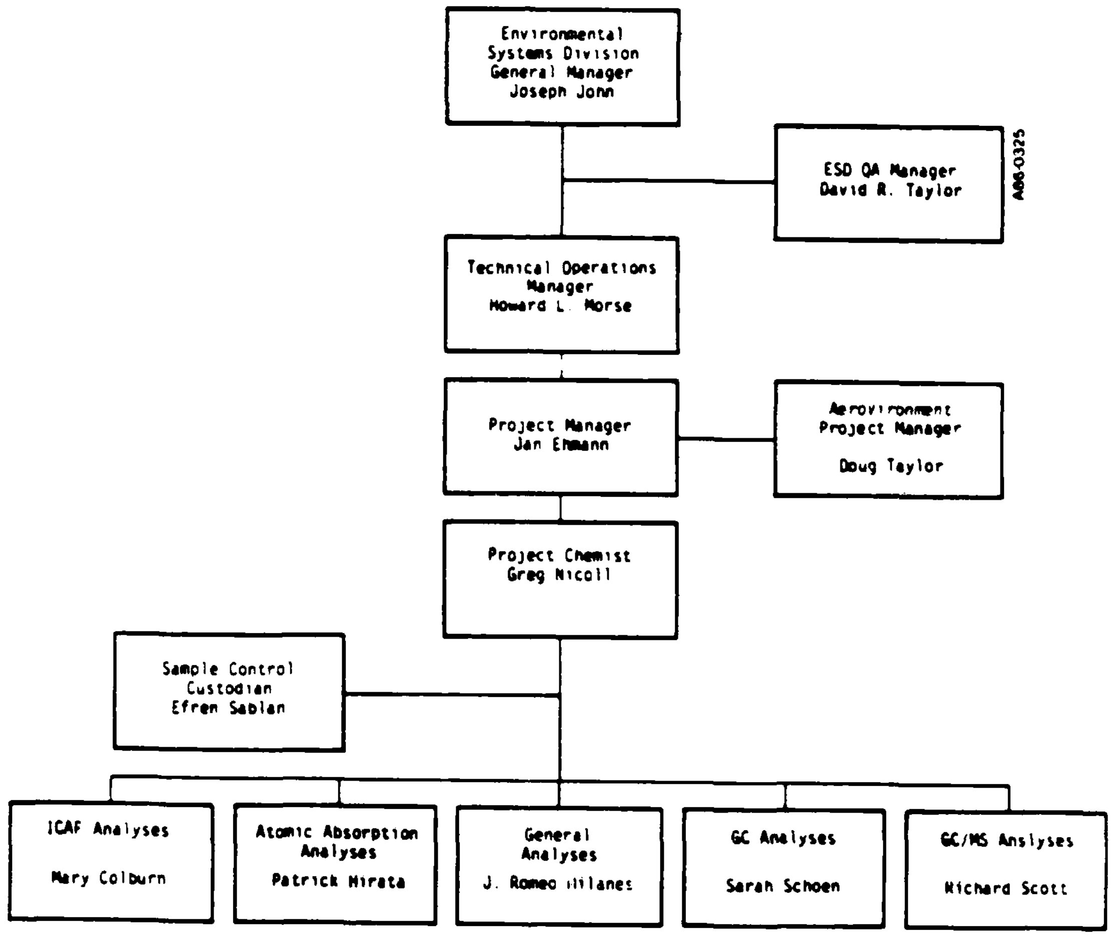

Figure 2.4-1. Project Organization

2.5 QA Objectives for Measurement Data in Terms of Precision, Accuracy, Completeness, Representativeness, and Comparability

QA objectives for precision, accuracy, and completeness are presented in Table 2.5.1. Method precision for each method will be determined from duplicate analyses. At least one sample in twenty will be analyzed in duplicate. Accuracy will be determined from spiked sample analyses. At least one sample in twenty will be spiked and the accuracy as percent recovery measured. Sample duplicate and spike analyses will be assigned by the sample custodian who will keep a running total of analyses required by each method.

Table 2.5.1 Summary of QA Objectives

Parameter	Groundwater			Soil		
	Precision, %	Accuracy, %	Completeness	Precision, %	Accuracy, %	Completeness
Volatile Organics	<15	60 to 145	>90	<15	60 to 140	>90
PCB's	--	--	--	<40	25 to 140	>90
Metals	<30	70 to 130	>90	<40	65 to 135	>90
Petroleum Hydrocarbons	<15	80 to 115	>90	--	--	--
Percent Moisture	--	--	--	<20	--	>90
TDS	<25	--	>90	--	--	--
Anions	<20	75 to 125	>90	--	--	--
Alkalinity	<15	80 to 120	>90	--	--	--
Phenol	<20	80 to 120	>90	--	--	--

2.6 Sampling Procedures

Sampling will be performed by AeroVironment. No bottles will be provided by Acurex. Sample holding times per analysis are shown in Table 2.6.1.

Analysis	Method Holding Time from Sampling
8010	14 days
8020	14 days
601	14 days
602	7 days (14 days if acidified)
200.7	6 months
418.1	28 days
8080	30 days (7 days for extraction)
160.1	Start analysis within 48 hours
SM249	2 days
D2216-71	Not specified in method
420.1	28 days
SM403	14 days
206.2	6 months
245.1	28 days
270.2	6 months
1010	14 days
1310	21 days

Table 2.6.1. Holding Times for Samples

2.7 Sample Custody

The sample custodian will verify the arrival of all samples against the AeroVironment Sample Submittal Form/Chain of Custody Record. Any discrepancies in the Samples and the SSF/COC Record will cause the sample custodian to immediately notify the AeroVironment Project Chemist.

Each sample or group of samples shipped to Acurex for analysis will be given an Acurex identification number. The Sample Custodian will record the client name, number of samples, and date in the Sample Control Log Book. The identification number will appear on a traveler (sample attached) that will be released when the samples are logged in. This traveler will identify the type of analyses requested for the samples and their holding times. When all analyses are completed, all sample extracts will be gathered and stored. Samples are disposed of after the holding times have expired, unless the sample has been marked "Hold" by AeroVironment. "Hold" samples will be disposed of with permission of the AeroVironment Project Manager.

All data, reports, and documents pertaining to samples are stored by the Sample Custodian either at Acurex or off-site.

More detailed descriptions of sample custody are found in Standard Operating Procedures: OP-SCC 3, Sample Custodian Duties; OP-DIV 1, Chain of Custody; OP-DIV 5, Sample Tracking on IFBs; OP-DIV 3, Security of Laboratory; and OP-SCC 1, Receipt and Opening of Samples.

Dept: GEN AA EXT MS GC SC

Client ____________________

Address ____________________

Attn: ____________________ Phone ____________________

No. of Samples __________ Flammable __________

Type S/W __________ Corrosive __________

Return/Hold 1 Mo __________ Reactive __________

EPA Case # __________ Toxic __________

Writer: __________ Lab ID# __________

Charge # __________ Location __________

Scheduling:

Date Rec'd __________

Date Issued __________

By __________

Due: Ext __________

VOA __________

Report __________

Special Instructions:

Dash	Sample Identification	Analysis Required

2.8 Calibration Procedures and Frequency

Calibration of the GC/MS system will be performed daily at the beginning of the day or with each 10 to 12 hours of instrument operating time. This will consist of mass calibration with FC-43, ion abundance calibration with decafluorotriphenylphosphine or bromofluorobenzene, and verification of response factors for each of the test compounds using standards of known concentrations. Decafluorotriphenyl phosphine (DFTPP) will be used to verify the ion abundance calibration for the GC/MS analysis of semivolatile organics, while bromofluorobenzene (BFB) will be used to verify the ion abundance calibration for the GC/MS analysis of volatile organics. Response factors will be determined daily and will be compared with the average values from a five-level calibration performed at the beginning of the project or following major instrument repair. When any one of fifteen calibration check compound response factors is outside of ±25 percent of the five-level calibration response factors, the instrument will be adjusted and the calibration check will be repeated until all fifteen calibration check compound response factors fall within 15 percent of the five-level calibration response factors or a new five-level calibration will be made.

Quantitation of samples that are analyzed by GC/MS will be performed by internal standard calibration. The internal standards that will be used are described in Section 2.11.1.

Quantitation of samples that are analyzed by GC will be performed by external standard calibration. Standards containing the compounds listed in each method will be analyzed at various concentrations (minimum three levels) to establish the linear range of the detector. Following multilevel calibration, analysis of samples will be initiated. Single point calibration will be performed at the beginning of each day and at every tenth injection.

The response factors from the single point calibration will be checked against the average response factors from multilevel calibration. If a deviation greater than 35 percent occurs then system recalibration will be performed. Alternatively, fresh calibration standards will be prepared and analyzed to verify instrument calibration.

Calibration for metals analyses will be performed at the beginning of each elemental analysis. After the instrument parameters are set, a multi-level (3-5 point) calibration will be performed. Instrument sensitivity will be determined. If the sensitivity is not comparable to the manufacturer's specifications, the instrument will be reset until it meets specifications. After every ten samples, a check standard will be run to verify that the calibration has not changed by more than 10%. A value outside of this range will require that the instrument be recalibrated and the last ten samples rerun. To determine the instrument detection limit which is defined as five times the standard deviation of the noise ("0" standard), five determinations are made of the "0" standard. This will be done at the conclusion of the run after the last analysis of the check standard.

Standard Operating Procedures OP-INORG 13 and 14 will be used for the measurement of lead.

Metals standards are replaced every six months. The new standard is checked against the old standard before replacement. If there is a large deviation, a certified standard is also run. If the new standard still does not match, it is remade. The preparation of the new standard is recorded in the Metals Standards Notebook.

2.9 Analytical Procedures

Only Acurex Standard Operating Procedures or methods found in EPA manuals, Standard Methods for the Examination of Water and Wastewater, or other standard accepted methods will be employed. Methods for Chemical Analysis of Water and Wastes (EPA, March 1983) is the standard reference for waters. Test Methods for Evaluating Solid Waste (EPA, July 1982) is the standard reference for soils. Table 2.9.1 shows the methods that will be employed for this project.

Parameter	Matrix	Method
VOA and xylenes	Soil	5030, 8010, 8020
VOA and xylenes	Water	601, 8020
ICP metals	Water	200.7
Petroleum Hydrocarbons	Water	418.1
PCB	Soil	3550, 8080
TDS	Water	160.1
Anions	Water	SM 429
Percent moisture	Soil	D2216-71 (ASTM)
EP Toxicity	Soil	40 CFR 216.24
Phenol	Water	420.1
Alkalinity	Water	SM403
Arsenic	Water	206.2
Mercury	Water	245.1
Selenium	Water	270.2

Table 2.9.1 Analytical Methods

2.10 Data Reduction, Validation, and Reporting

The following calculations will be used.

2.10.1 Determination of Concentration of Compound X By Internal Standard Quantitation Techniques (GC/MS Analysis)

Amount of a certain compound found in the water or soil will be calculated as follows:

$$\text{Amount found } (\mu g) = \frac{A_{compound}}{A_{I.S.}} \times \frac{W_{I.S.}}{RRF} \times \frac{V_{extract}}{V_{injected}}$$

where

$A_{compound}$ -- area of the quantitation ion for Compound X

$A_{I.S.}$ -- area of the quantitation ion for the internal standard

$W_{I.S.}$ -- amount of internal standard (ng)

RRF -- average relative response factor determined from multilevel calibration

Vextract -- volume of extract (mL)

$V_{injected}$ -- volume injected (µL)

The concentration of Compound X in water or soil will be calculated as follows:

$$C_{water}(\mu g/L) = \frac{\text{Amount found } (\mu g)}{V_{water}(L)}$$

where

V_{water} is the volume of water (L) used for extraction:

$$C_{soil}\ (\mu g/g) = \frac{\text{Amount found } (\mu g)}{W_{soil}(\text{dry weight})}$$

where:

W_{soil} is the dry weight of soil (g) used for extraction

2.10.2 Determination of Concentration of Compound X by External Standard Quantitation Techniques (GC Analysis)

The amount of test compound analyzed by GC will be calculated as follows:

$$\text{Amount found (ng)} = \frac{A_{compound}}{RF} \times \frac{V_{extract}}{V_{injected}}$$

where

$A_{compound}$ -- the absolute area of Compound X

RF -- response factor determined from external standard calibration (absolute area counts/amount injected)

$V_{extract}$ -- volume of extract (mL)

$V_{injected}$ -- volume injected (µl)

Concentration of compound in water or soil will be calculated as indicated above in 2.10.1 using the appropriate units.

2.10.3 Equations for General Chemical and Metals Analyses

Equations to calculate general chemical measured parameters are found in the standard operating procedures used during the determination of the specified analyte. Only in cases where the standard is worked up with the samples (such as phenol or cyanide) will there by any correction for recovery. Reporting units are in mg/L for aqueous samples for TOC, oil and grease, anions and cations; µg/L for aqueous samples for cyanide, phenols, and metals; and µg/g for soil samples. In most cases, no more than two significant figures are reported with one significant figure used for the blank.

All raw data and calculations that are not written on printed data forms will be entered into a laboratory logbook in a legible and orderly

fashion. Example calculations and observations shall be included according to Standard Operating Procedure OP-QA6 Laboratory Notebook Procedure.

2.10.4 Data Integrity

Blanks, duplicates, and spiked sample analyses will be used to validate data. Blanks will be run for all analyses. The supervisor will have the analysis repeated when (1) the blank level is too high (causing the detection limit to be in the quantitative area of interest), (2) replicate analyses are outside of the QA objectives, or (3) spiked sample analyses have recoveries that are outside of the QA objectives and the blank level, or the precision, or the accuracy results do not meet the QA Plan requirements.

Other important checks on the data include the reproducibility of check standards (within 20%) and the system sensitivity compared to previous analyses (within 20%). Data transcription and calculations are also checked.

2.10.5 Data Flow

Data are generated by the analyst who performs the analysis and does the data calculations. The supervisor reviews the reduced data and forwards it to the Project Chemist, who also approves the report before submission to AeroVironment. The methods employed in the analyses shall be reported to AeroVironment. A copy of the report and raw data are kept according to Standard Operating Procedure OP-DIV 1, Chain of Custody.

2.11 Internal QC Check

The following QC checks will be employed.

2.11.1 Organic Internal Quality Control Checks

Surrogate compounds will be added to all samples that are to be confirmed by EPA Methods 624 or 8240 including method blanks, duplicate samples, and matrix spikes. The compounds that will be used as surrogates and the levels recommended for spiking are given in (Table 2.11-1). Surrogate spike recoveries must fall within the limits listed in Table 2.11-2, otherwise analysis has to be repeated.

To monitor the performance of the GC/MS system, internal standards such as: bromochloromethane, 1,4-difluorobenzene, and chlorobenzene-d_5 will be spiked, into each sample extract or sample to be purged, immediately prior to the GC/MS analysis.

Surrogate compounds will be run for volatile organic analysis by gas chromatography. When surrogate recovery falls below 50% for EPA Methods 601, 602, 8010, and 8020 the specific sample analysis will be repeated.

For EPA Methods 601 and 602, daily check standards will be run for all aqueous volatile organic gas chromatographic runs. Agreement to the previously prepared calibration curve must be within 35%

Organic quality control samples will be analyzed monthly. These samples will be obtained from the EPA Cincinnati and will be released by the Sample Custodian monthly at the beginning of each month. A minimum of one quality control sample for each type of analysis (e.g., purgeable GC/MS, halogenated purgeables, purgeables aromatics) will be performed monthly.

Table 2.11-1. Surrogates and Spiking Concentrations Recommended for EPA Methods 624 and 8240

Compound	Amount in Sample Extract (μg)				
	Fraction	Low H_2O	Medium H_2O	Low Soil	Medium Soil
Toluene-d_8	VOA	50	50	50	50
4-Bromofluorobenzene	VOA	50	50	50	50
1,2-Dichloroethane-d_4	VOA	50	50	50	50

Table 2.11-2. Acceptable Recoveries of the Surrogate Compounds

Fraction	Surrogate	Water	Soil
VOA	Toluene-d_8	86-119	69-127
VOA	4-Bromofluorobenzene	85-121	61-122
VOA	1,2-Dichloroethane-d_4	77-120	64-129

2.11.2 Inorganic Internal QC Checks

Method blanks will be run at a minimum frequency of one per batch. Duplicate analyses will be performed at a minimum frequency of one per 20 samples (5%). Matrix spike analyses will be performed at a minimum frequency of one per 20 samples (5%).

Check standards are run every 10 samples on the atomic absorption spectrophotometer and the inductively coupled argon plasma spectrometer to verify that the calibration is within 10%.

Check standards are run every 10 samples on the infrared and ultra-violet spectrometers as well as the ion chromatograph to verify that the calibration is within 10% of the original calibration curve. When the calibration is outside 10%, the instrument will be recalibrated and the previous samples rerun.

2.12 Performance and System Audits

The Department of Health Services performs a systems audit every three years. Internally, systems and performance audits are performed at least once every three months by the supervisor of each area. QA samples obtained from external sources are analyzed to check performance in terms of accuracy and freedom from contamination. Notebooks, records, the employed methodology, calculations, reporting, data quality, and good laboratory practices are checked. The Division Quality Assurance Manager will also submit blind performance audit samples and conduct systems audits. In addition, AeroVironment will perform a systems audit at Acurex for the methods referenced under Section 2.9.

2.13 Preventive Maintenance

Acurex currently operates a three-GC/MS unit operation and is located within 7 miles of the supplier's local Finnigan office. The preventive maintenance of the GC/MS instruments is performed on an as needed basis in addition to a thorough instrument maintenance twice a year. Extra parts such as ion sources, filament assemblies, mass analyzers, and electron multipliers are in stock at Acurex. The GC/MS Operations Manager is responsible for the preventive maintenance of the GC/MS instruments.

The preventive maintenance of the GC instruments is also done on an as needed basis by Richard Wood and Nicki Heath, who were formerly with Varian Associates. Acurex is located within two miles of the supplier's local Sunnyvale office.

The instruments used in general chemistry are maintained by the manufacturers. The atomic absorption spectrophotometer receives yearly preventive maintenance from Perkin-Elmer Corporation. The analytical balance receives preventive maintenance every 6 months. The infrared spectrometer and ultraviolet/visible spectrometer receive preventive maintenance as needed. Logbooks are kept for each instrument showing instrument problems and service. Supplies of instrument expendables are maintained on a three month basis.

2.14 Specific Routine Procedures Used to Assess Data Precision, Accuracy, and Completeness

Precision will be determined through duplicate analyses. Accuracy will be determined on spiked sample analyses and performance audit analyses. Whenever accuracy, precision or completeness deviates from the goal itemized in Section 2.5, the source of the problem will be determined and corrected.

2.14.1 Precision

Precision as percent relative difference will be calculated as follows:

$$\text{Precision} = \frac{X_1 - X_2}{\frac{X_1 + X_2}{2}} \times 100$$

where X_1 is the larger value and X_2 is the smaller value of 2 replicate values.

2.14.2 Accuracy

Accuracy as percent recovery will be calculated from results of analyses of spiked samples as follows:

$$\text{Accuracy} = \frac{A - B}{C} \times 100$$

where

A = the analyte determined experimentally from the spiked sample

B = the background level determined by a separate analysis of the unspiked sample

C = the amount of the spike added

Accuracy as percent recovery will also be measured on determinations of performance audit samples.

2.14.3 Completeness

Completeness will be calculated as the ratio of acceptable measurements obtained to the total number of planned measurements.

2.15 Corrective Action

Corrective actions are initiated whenever measurement precision, accuracy, or completeness deviate from the objectives established in Section 2.5. In addition, corrective actions are initiated whenever problems are identified through the internal auditing procedures described in Section 2.12.

Corrective actions begin with identifying the source of the problem. Examples of potential problem sources include failure to adhere to prescribed measurement procedures, equipment malfunction, or systematic contamination. Corrective actions appropriate for these problems (respectively) are more intensive staff training, equipment repair followed by a more intensive preventive maintenance program, and removal of the source of contamination.

The supervisor has the primary responsibility for initiating and completing corrective actions for measurement systems. The QA Manager monitors the progress of corrective actions and ensures that they proceed in a timely manner. The Project Manager approves all corrective actions, and depending on the severity of the problem, obtains concurrence from the client.

2.16 QA Reports to Management

The GC/MS Operations Manager, GC Task Leader, and Inorganic Chemistry Manager are responsible for evaluating measurement accuracy and precision on a routine basis, and reporting results from the evaluations to the Laboratory Director and the QA Manager. Reports on corrective actions and their resolution are prepared by the responsible individual and submitted to the QA Manager and the Laboratory Director. Each analytical report will include data quality information.

APPENDIX A

STANDARD OPERATING PROCEDURES

DEPARTMENT OPERATING PROCEDURE

DATE: February 4, 1988

Replaces: February 15, 1984

PROCEDURE TITLE: Chain of Custody Procedure

AREA OF APPLICABILITY: Acurex Analytical Laboratory

PROCEDURE:

1. General

1.1 Documentation of the possession of a physical sample or other evidentiary materials is important to insure that a sample is traceable from the time it is collected until it is introduced as evidence in legal proceedings. Failure to provide accurate documentation may result in unnecessary challenges to data validity. In order to minimize these risks the folowing procedures must be followed.

2. Sample Storage

2.1 Samples should be delivered directly to the Acurex Sample Custodian. Registered or certified freight is also acceptable. Samples and information regarding samples is to be signed into custody of the Sample Custodian using Chain-of-Custody forms. The samples must be stored in a secure area until analysis is completed or samples are returned to the customer. Samples requiring maximum custody will be held in locked coolers in the walk-in or outside the walk-in in the locked Sample Control area for storage at room temperature. The Sample Custodian will maintain a log of all samples or extracts under extra lock-and-key.

2.2 When samples are removed from the Sample Control area, they will be checked out by signing the person's name, date, the sample traveller, and a rough description (such as 8 gallon ambers or 6 cyanides). The check-out list will be kept on the walk-in wall. Samples requiring maximum custody will be signed out using chain-of-custody forms. The sample custodian will release samples for analysis that are under extra lock-and-key.

2.3 When samples are returned to Sample Control, they will be returned to the shelf designated for that purpose (shelf A in the walk-in for cold storage and shelf J outside the walk-in for warm storage). The person who returns the sample will place his signature and date in the appropriate space on the check-out list. Sample Control personnel will then replace the samples in the original storage location. Maximum custody samples will be signed back to the Sample Custodian using chain-of-custody forms and be placed back under extra lock-and-key by the Sample Custodian.

3. Extract Storage

3.1 When extractions are started, all related information will go onto a page in the extraction bench sheet at that time. When a vial is capped, the final volume will then be written on the bench sheet. After a traveler is finished, all extracts will go into one or more vial holders (no more than one traveler to a vial holder). The vial holder will be labelled with the traveler number and the type of analysis on the outside of the box on the short side. The vial holder will then be taken to the designated refrigerator in the GC/MS Laboratory. The extract list will be filled out listing the name of the person, date, traveler, and type of analysis. Extracts from partially completed travelers will be kept in the extraction freezer.

3.2 Old VOAs and analyzed extracts from GC and GC/MS will be taken by GC and GC/MS personnel to Sample Control. The vials will be placed on shelf A in the walk-in and the vial list filled out with the name of the person, date, traveler, type of analysis and number of vials. Sample Control personnel will then relocate the vials and write the location in the Sample Control log. Maximum custody extracts and VOAs will be signed in to the sample custodian using chain-of-custody forms and stored in locked coolers in the walk-in.

4. Disposal of Samples

4.1 Normal samples will be disposed in a safe manner two months after the report is sent to the customer. Extracts and digests will be held for three months after the report is sent.

4.2 EPA samples and extracts as well as in-house customer samples and extracts will be disposed only when Sample Control receives permission from the project manager.

5. Reports and documents

5.1 All data, reports and documents pertaining to samples are to be assembled according to document control procedures and kept in a secure area.

5.2 Industrial reports are stored by customer name. The current reports come first, followed by last year's reports, and finally reports from the year before last. After two years, reports are stored off-site. Whenever a file is removed an "out card" will be inserted in its place with the name of the file, the name of the person removing the file, and the date.

5.3 Raw data of industrial analyses is stored for only one year on-site. Unlike final reports, raw data is stored by traveler number.

Approved by: John H. Taylor, Jr.   Date: 3-7-85
John H. Taylor, Jr.
Laboratory Director

Reviewed by: Ted B. Willhite   Date: 3/8/85
Ted B. Willhite
Quality Assurance Representative

TECHNICAL OPERATING PROCEDURE

OP-DIV 3
PAGE 1 OF 2
DATE: October 28, 1983

Replaces: OP-DIV 3
January 19, 1982
OP-QA-1
January 15, 1982

PROCEDURE TITLE: SECURITY OF LABORATORY

AREA OF APPLICABILITY: Acurex Analytical Laboratory, Organic Extraction Area

SCOPE:

PROCEDURE:

1. Exterior Doors

1.1 All exterior doors will be kept locked and closed unless fully monitored by an Acurex employee. The front door will be unlocked during business hours while an Acurex employee is at the front desk. If the employee leaves the reception area, the front door will be locked.

1.2 Fully monitored is defined as the Acurex employee having complete knowledge whether someone has entered the building or not entered.

2. Visitors

2.1 Visitors to facilities will be fully monitored by Acurex personnel until they enter the facilities' offices. Facilities personnel will monitor their visitors back to the reception area or out the door if the reception area is empty.

2.2 Most visitors to EED personnel will sign-in, receive a cloth Acurex identification tag, be escorted while in the building, and sign-out.

2.3 Visitors do not include Acurex personnel who have an Acurex identification badge (permanent or temporary) and Acurex contractors who have an Acurex "C" identification badge.

3. Unauthorized Entry

3.1 Visitors who are not escorted will be challenged. The visitor should be escorted to the person who is being visited or out the door. The visitor should be logged-in if that has not been already performed. If the visitor will not comply with verbal requests, Acurex Security should be notified immediately.

Replaces: OP-DIV 3
January 19, 1982
OP-QA-1
January 15, 1982

PROCEDURE (Continued)

4. Interior Doors

4.1 The sample custodian is responsible for locking the walk-in refrigerator at the end of his shift. Anyone using the walk-in refrigerator after the sample custodian has left is responsible for maintaining its security.

4.2 The last person in the water laboratory is responsible for locking all interior doors in the water laboratory. The last person in the GC/MS is responsible for locking all interior doors in that area. The receptionist is responsible for locking the front office files at the end of his shift. Anyone using those files after the receptionist has left is responsible for maintaining their security.

5. Data Archives

5.1 All EPA reports and original raw data will be placed into or out of the locked files by only the document control officer.

5.2 Industrial reports and raw data will be placed into laboratory files by a member of the operations group. Reports and data may be removed by inserting an "out" card in place of the file. This card will have the name of the person using the file, date, and title of file.

5.3 Industrial reports will be put in cold storage after 2 years. Industrial raw data will be put in cold storage after 1 year.

Approved by: John H. Taylor — Date: 11-21-83
John H. Taylor
Laboratory Director

Reviewed by: Erick Hagmann — Date: Nov. 28, 1983
Erick Hagmann
Quality Assurance Representative

DEPARTMENT OPERATING PROCEEDURE

OP-DIV 5
PAGE 1 of 2
DATE: August 30, 1984
REPLACES: Original

PROCEDURE TITLE: Sample tracking on IFBs

AREA OF APPLICABILITY: Acurex Analytical Laboratory

PROCEDURE:

1. Sample Preparation

   1.1 Preparation of IFB samples will be documented. All analysts will have a permanent laboratory notebook. Bench sheets will be used to denote when sample extraction starts, finishes, and when samples are delivered to instrumentation area (bottled date). Notebook pages and bench sheets will show the EPA case number and sample number. The initials of all analysts working on extractions will be written on the bench sheet as well as the date.

2. Sample Analysis

   2.1 The analysis of IFB samples will be documented. All analysts will have a permanent laboratory notebook. Instrument logs will be used to denote when sample analysis begins. Notebook pages and instrument logs will show the EPA case number and sample number, date, and analyst initials or name. A signature record with initials will be kept by the document control officer.

3. Document Filing

   3.1 The Document Control Officer will assemble all notebook pages, bench sheets, chromatograms, computer printouts, copies of instrument logs, and other appropriate information in a case file following procedure OP-QA 4. In the case file will be a copy of the final report which will show when the report was mailed. The document file also includes a document inventory which lists all documents by serial number, case number and region number for each document.

   3.2 After 6 months the complete case file will be purged and forwarded to EPA.

4. Receipt of Vials after Analysis

4.1 After the report is sent, the sample custodian will take possession of all IFB vials for a case. Six months after the case is submitted, vials will be shipped back to EPA or properly disposed. The final disposition will be recorded.

Approved by: M. Claire Ferguson Date: 8/30/84
M. Claire Ferguson
Operations Manager

Reviewed by: Tec B. Willhite Date: Oct 31, 1984
Tec B. Willhite
Quality Assurance Manager

DEPARTMENT OPERATING PROCEDURE

OP-SCC 1
PAGE 1 OF 2
DATE: 8/31/81
REPLACES: 5/28/81

PROCEDURE TITLE: Receipt and Opening of Samples

AREA OF APPLICABILITY: Acurex Analytical Laboratory Sample Control Center

PROCEDURE:

All packages received by Acurex Laboratory Shipping and Receiving Department which are not clearly marked as being purchased items are delivered to the Sample Control Center.

Upon receipt the package will be opened by the Sample Custodian. The contents and any paper work will be examined. If the containers are broken or if there is leakage, the custodian will wear disposible gloves when handling the samples, and then properly dispose of the packing materials. If the sample has a strong odor or appears volatile, it will be placed immediately in a hood area.

All caution statements that arrive with the sample or are on the package should be noted, ie., toxic, caustic, flammable.

If a letter, P.O., request form, or other correspondence is included in the package, it is used to check the contents. The Sample Control Pending Work File and the Master Client Card File are also checked for pertaining memos, P.O.'s, correspondence or information.

All information is checked and any deviations are noted on the correspondence and/or traveler.

If the samples are time critical they will be logged-in first. The project chemist should be notified at once.

If there are questions or problems the following procedures will apply:

1. If there are broken samples or unmatched sample ID's or codes, the Sample Custodian may contact the client directly to resolve these problems.

2. If there is no correspondence or information in either the Work Pending File or the Standing Order Customer Card File, the Sample Custodian will notify the Marketing Manager and the Lab Supervisors to determine the originator of the job. The originator will then call the client to resolve the problem.

3. Problems should be resolved in the quickest manner so that analysis can begin as soon as possible.

4. Correspondence (P.O., memo, request) which arrives separately from the sample should be stamped with the date received and filed alphabetically in the Work Pending File.

DEPARTMENT OPERATING PROCEDURE

5. Special instructions concerning a group of samples will be followed as mucn as is possible within the sample log-in procedure.

6. Samples that are involved in court cases should be handled according to OP-DIV 1, Chain-of-Custody Procedure.

7. When correspondence has remained in the Work Pending File in excess of 15 days and no samples have been received, the correspondence will be taken from the file and turned over to Marketing (or other originator) for handling and follow-up with the client.

8. Purchase Orders

8.1 When P.O.'s are received with the samples, they will be processed with the other paperwork and attached to the traveler.

8.2 When a standing P.O. (one which covers more than one shipment of samples) is received it will be stamped with the date received. A copy of the P.O. will be kept in the P.O. Tickler File in the month of expiration. The P.O. number will be noted in the Customer Card File. The original will be placed in the Customer Contract File.

8.3 When P.O.'s are received independently of the smaples:

8.3.1 They are stamped with the date received.

8.3.1.1 If the samples have already arrived and have been logged-in, the appropriate traveler is found and the P.O. is attached.

8.3.1.2 If the samples have not been received the P.O. is placed in the Work Pending File along with any other correspondence.

8.4 When P.O.'s are received after the job is completed and invoiced:

8.4.1 P.O. is stamped with date received and the P.O. number is noted in the Request for Invoice Log. The P.O. is then filed in the Client Final Report File with the appropriate traveler.

Approved by: Linda Bohannon Date: 9/3/81
Linda K. Bohannon, Manager
Sample Control Center

Reviewed by: Erick Hagmann Date: 9/3/81
Erick Hagmann
Quality Assurance

PROCEDURE TITLE: Sample Custodian Duties

AREA OF APPLICABILITY: Acurex Analytical Laboratory, Sample Control Area

SCOPE: Description of Responsibilities and Duties of Sample Custodian

PROCEDURE:

1. Receiving Samples

 1.1 The Sample Custodian responsibilities include controlling the sample from receipt through analysis to the disposal of the sample. Upon receipt of samples, the Sample Custodian will check for the presence of work orders or other information about sample analysis from the project managers and sales staff in the Work Pending File. The Master Client Card File will be checked for additional information. If necessary, the project managers or sales staff will be consulted.

 1.2 The Sample Custodian will check the condition and integrity of sample containers to see if they are intact, not leaking, and properly preserved. After sample integrity has been assured, the samples will be logged-in.

 1.3 The Sample Custodian will assign an Acurex identification number in the Sample Control Log Book and record the client name, date of arrival, number of samples, and the due date of the report.

 1.4 When IFB samples do not arrive on time or when a problem comes up from the paperwork with IFB samples such as missing samples, broken chain-of-custody seals, or unusual instructions, the Sample Custodian will notify the IFB project manager and Sample Management Office.

2. Traveler

 2.1 The Sample Custodian will completely fill out a blue traveler for each batch of samples. This includes: client informaton, areas involved in analysis, report writer, laboratory ID number, charge number, sample location, number of samples, type of samples, holding time, EPA case number for IFB samples, whether samples are known or suspected to be hazardous, date traveler issued, date samples received, associated due dates, special instructions, customer sample identification, corresponding Acurex identification, required analyses and quality assurance, and billing information.

2.2 The front side copies of the traveler will be distributed to the appropriate laboratory supervisors and the project manager/sales representative.

2.3 If corrections, additions, or deletions need to be made to any traveler, copies of the revised edition will be marked with a yellow highlighter pen "revised," dated, and initialed.

2.4 All correspondence, memos, PO's, phone messages, bills of lading and technical information will be attached to the original blue traveler and held in the Sample Control Center until the job is completed.

2.5 Each sample bottle will be labeled with the assigned laboratory ID number and stored according to OP-DIV 1.

3. Sample Access and Disposal

3.1 The Sample Custodian will see that all samples are stored in controlled access areas according to OP-DIV 1.

3.2 Samples will be disposed by the Sample Custodian in a safe manner following OP-DIV 1, OP-SCC 4, and OP-ORG 28. Water samples that do not contain significant levels of known hazardous materials will be diluted and washed down the drain. Soil or sludge samples that do not contain significant levels of known hazardous materials will be placed in the trash with the sample container lids removed. Liquid organic samples which are not known to be hazardous such as oil, will be disposed into the flammable solvent drum. Hazardous materials will be collected and sent to a Class 1 dump. The project manager will make the determination as to whether a sample is hazardous or not.

4. Weekly Status Reports

4.1 Each week the Sample Custodian will prepare an input into the Status Report on all new samples within the past week. This includes the traveler number, number of samples to be analyzed within each area of the laboratory, due date, and price.

4.2 The Sample Custodian will also fill out the weekly IFB report on the number of samples received and status of late reports. The report will then go the laboratory director for his approval before mailing to Sample Management Office.

Approved by: Greg Nicoll Date: 7-25-85
Greg Nicoll
Manager, Inorganic Chemistry

Reviewed by: Sarah R. Schoen Date: 7-25-85
Sarah R. Schoen, Ph.D.
Quality Assurance Representative

INSTRUMENT OPERATING PROCEDURE

PROCEDURE TITLE: AAS Setup for Heated Graphite Furnace Determinations

AREA OF APPLICABILITY: Acurex Analytical Laboratory, Inorganic Analysis Area

SCOPE: Setup of Perkin-Elmer 460 Atomic Absorption Sepctrophotometer For Heated Graphite Furnace Determinations.

PROCEDURE:

1. Instrument Setup

   1.1 Refer to Instrumental Operating Procedure "Atomic Absorption Spectropnotometer Setup For Flame Determinations", Section 1.

2. Heated Graphite Furnace Setup

   2.1 Install HGA furnace. Check alignment of furnace with AA in absorbance mode. Replace graphite tube and adjust injector for proper fit. Fill acid rinse reservoir and clean furnace windows. Turn on cooling water and purge gas. Refer to "Analytical Methods For Atomic Absorption Spectroscopy" for proper dry, char, and atomization temperatures.

3. Calibration Programming

   3.1 Refer to Instrumental Operating Procedure "Atomic Absorption Spectrophotometer Setup For Flame Determinations".

Approved by: Greg Nicoll Date: Aug 30, 1984
Greg Nicoll
Manager, Inorganic Chemistry

Reviewed by: Ted B. Willhite Date: Oct 31, 1984
Ted B. Willhite
Quality Assurance Representative

INSTRUMENT OPERATING PROCEDURE

OP-INORG 14
PAGE 1 of 1
DATE: August 29, 1984

PROCEDURE TITLE: Atomic Absorption Analyses

AREA OF APPLICABILITY: Acurex Analytical Laboratory, Inorganic Analysis Area

SCOPE: Treatment of Samples During Atomic Absorption Analysis - Flame or HGA

PROCEDURE:

1. Standards

   1.1 Refer to "Analytical Methods for Atomic Spectroscopy" for appropriate standard levels. Standards are checked against a National Bureau of Standards certified reference material where applicable.

   1.2 Samples are bracketed by the standards. Any sample read as off scale is diluted to a suitable level. Calibration checks are run every 5-10 samples. A greater than 10% drift indicates the need for recalibration.

2. Matrix Checks

   2.1 Each type of sample matrix is checked by methods of standards addition. If there is more than a 10% difference between the straight reading and the standard addition run, all samples should be quantitated by MOA.

3. Quality Control

   3.1 Quality control normally consists of ten percent duplicate samples, ten percent spike samples and a method blank per batch.

Reference: "Analytical Methods For Atomic Absorption", Perkin-Elmer Corp.

Approved by: Greg Nicoll Date: Aug 30 1984
Greg Nicoll
Manager, Inorganic Chemistry

Reviewed by: Ted B. Willhite Date: Oct 31, 1984
Ted B. Willhite
Quality Assurance Representative

TECHNICAL OPERATING PROCEDURE

OP-QA 6
PAGE 1 of 1
DATE: March 1,1984
Replaces: Original

PROCEDURE TITLE: Laboratory Notebook Policy
AREA OF APPLICABILITY: Acurex Analytical Laboratory

PROCEDURE:

1. General Requirements

1.1 All raw data and calculations that are not written on printed data forms will be correctly entered into a laboratory logbook in a legible and orderly fashion such as tables.

1.2 Example calculations and units will be included.

1.3 Observations and conclusions will be included.

1.4 If the procedure can not be found in a SOP, published method, or in a contract, it will be written. A reference to the procedure and any changes will be written.

1.5 The sample traveler number and customer ID number will be included.

1.6 The date that the work was started will be written.

1.7 Only black ink should be used. No white-out will be used. Where part of a page is left blank, an "X" should be used to fill in the remaining space.

2. Requirements for work that may go to court (IFB, etc.)

2.1 All pages used will have the case # written on the page (only one case per page). Also the signature of the person doing the work and a co-signer will appear on each page.

2.2 Copies of notebook pages will go to the document control officer.

Approved by: Greg Nicoll 3/29/84
Greg Nicoll
Operations Manager

Reviewed by: Erick Hagmann 3/29/84
Erick Hagmann
Quality Assurance Representative

APPENDIX F

Chain of Custody Forms

8611-030 Sheet 1 of 1

AeroVironment Inc.
825 Myrtle Avenue · Monrovia California 91016
Telephone 818/ 357-9983

SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

SITE MATHER AFB · AC&W

AV PROJECT NO. 10416L

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO: C. LUNDAHL

Column groups: DO NOT EXCEED THESE HOLDING TIMES (Halogen Volatiles through Purgeables); MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION (Base/Neutral Acids through Pesticides); ONE BOTTLE (TDS through Anions); MUST BE ANALYZED WITHIN 28 DAYS (Priority Pollutant Metals through Na, Fe, Mn, Mg, Ca, K); ICP minerals

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	TDS	MUST BE ANAL./EXT. BY THIS DATE	ALKALINITY	MUST BE ANAL./EXT. BY THIS DATE	ANIONS	MUST BE ANAL./EXT. BY THIS DATE			PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8)	Na, Fe, Mn, Mg, Ca K - by ICP	NUMBER OF SAMPLE CONTAINERS
000751	11/10	1130		✓	11/24	✓	11/17									✓	11/12	✓	11/24	✓	11/12						✓	5
752	11/10	1500		✓		✓										✓		✓		✓							✓	5
753	11/11	0900		✓	11/25	✓	11/13									✓	11/13	✓	11/25	✓	11/13						✓	5
754	11/11	1130		✓		✓										✓		✓		✓							✓	5
755	11/11	1230		✓		✓										✓		✓		✓							✓	5
756	11/11	15		✓		✓										✓		✓		✓							✓	5
757	11/11	1630		✓		✓										✓		✓		✓							✓	5
758	11/11	1730		✓		✓										✓		✓		✓							✓	5

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT
Signature: [signature]	Signature	Signature	Signature: [signature] Time: 1410	Total Number of Containers: 40
Printed Name: C. LUNDAHL Time: 6:30 PM	Printed Name: GREYHOUND	Printed Name: BUS LINES	Printed Name: EFREN A. SABLAN Date: 11/12/86	Chain of Custody Seals: YES
Company: AeroVironment Date: 11/11/86	Company	Company	Company: Acurex LABS	Rec'd Good Condition/Cold: OK
				Conforms to Record: YES
				Lab No. 8611-030

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AV F OA 18

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8611-037 SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SHEET 1 of —

SITE 4C &W-MATHER AFB

AV PROJECT NO. 10416L

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO: C. LONDAHL

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DO NOT EXCEED THESE HOLDING TIMES: Halogen Volatiles through Purgeables

MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION: extraction columns through Pesticides

ONE BOTTLE: TDS through Anions

MUST BE ANALYZED WITHIN 28 DAYS: metals columns

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624 8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES/PCB 608 8080	MUST BE EXTRACTED BY THIS DATE	TDS	MUST BE ANAL/EXT. BY THIS DATE	ALKALINITY	MUST BE ANAL/EXT. BY THIS DATE	ANIONS	MUST BE ANAL/EXT. BY THIS DATE			PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8)	Na, Fe, Mn, Mg, Ca, K	NUMBER OF SAMPLE CONTAINERS
000759	11/12	0930		✓	11/26	✓	11/19									✓	11/14	✓	11/26	✓	11/14						✓	5
760	11/12	1230		✓		✓										✓		✓		✓							✓	5
761	11/12	1310		✓		✓										✓		✓		✓							✓	5
762	11/12	1330		✓		✓										✓		✓		✓							✓	5
763	11/12	1515		✓		✓										✓		✓		✓							✓	5
764	11/12	1645		✓		✓										✓		✓		✓							✓	5

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT	
Signature: [signature]	Signature / Time	Signature	Signature: Eleen A. Seblan / Time: 0915	Total Number of Containers	30
Printed Name: C. J. LONDAHL / Time: 5:50p	Printed Name: GREYHOUND / Date	Printed Name: BUS LINES / Time	Printed Name: EILEEN A. SEBLAN / Date: 11/13/86	Chain of Custody Seals	YES
Company: AeroVironment / Date: 11/12/86	Company	Company / Date	Company: ACUREX LAB	Rec'd Good Condition/Cold	OK
				Conforms to Record	YES
				Lab No. 8611-037	

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8611-040

Pg 1 of 1

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Telephone 818/357-9983

SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE Mather AFB

AV PROJECT NO. 10416

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO: C Coleman

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DO NOT EXCEED THESE HOLDING TIMES | MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION | GA DHS TLC | MUST BE ANALYZED WITHIN 28 DAYS

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC MS 624 8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE NEUTRAL ACIDS GC MS 625 8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	TDS	MUST BE ANAL EXT BY THIS DATE	ALKALINITY	MUST BE ANAL EXT BY THIS DATE	Anions	MUST BE ANAL EXT BY THIS DATE			PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8)	Mn, Fe, Ca, Mg, Na	NUMBER OF SAMPLE CONTAINERS
000765	11/13	0930		✓	11/21	✓	11/20									✓	11/15	✓	11/21	✓	11/15						✓	5
766	11/13	1105		✓		✓										✓		✓		✓							✓	5
767	11/13	1255		✓		✓										✓		✓		✓							✓	5
768	11/13	1450		✓		✓										✓		✓		✓							✓	5
769	11/13	1645		✓		✓										✓		✓		✓							✓	5
770	11/13	1700		✓		✓										✓		✓		✓							✓	5

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT	
Signature [signature] Time	Signature Time	Signature	Signature [signature] Time 11:30	Total Number of Containers	30
Printed Name C. Coleman Time	Printed Name Greyhound Date	Printed Name Bus Lines Time	Printed Name Edward A. Sabbah Date 11/14/86	Chain of Custody Seals	yes
Company AeroVironment Date 11/13/86	Company	Company Date	Company Acurex Lab	Rec'd Good Condition/Cold	OK
				Conforms to Record	yes
				Lab No. 8611-040	

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Pg 1 of 1 8611-043

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SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE Mather, CA ?

AV PROJECT NO. 104166

DISPOSE OF SAMPLES __ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO: C. Lovdahl

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DO NOT EXCEED THESE HOLDING TIMES | MUST BE ANALYZED WITHIN 30 DAYS AFTER EXTRACTION | 1 bottle | MUST BE ANALYZED WITHIN 28 DAYS

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC MS 624 8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE NEUTRAL ACIDS GC MS 625 8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	TDS	MUST BE ANAL. EXT. BY THIS DATE	ALKALINITY	MUST BE ANAL. EXT. BY THIS DATE	ANIONS	MUST BE ANAL. EXT. BY THIS DATE			PRIORITY POLLUTANT METALS (13)	CAM METALS TTLC/STLC	EP TOX METALS (8)	Na, Ca, Mg, K	NUMBER OF SAMPLE CONTAINERS
000771	11/14	0815		✓	11/20	✓	11/21									✓	11/16	✓	11/28	✓	11/15						✓	5
000772	11/14	0915		✓		✓										✓		✓		✓							✓	5
773	11/14	1100		✓		✓										✓		✓		✓							✓	5
774	11/14	1230		✓		✓										✓		✓		✓							✓	5
775	11/14	1410		✓		✓										✓		✓		✓							✓	5
776	11/14	1540		✓		✓										✓		✓		✓							✓	5
777	11/14	1615		✓		✓										✓		✓		✓							✓	5

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT
Signature [signature]	Signature / Time	Signature	Signature / Time	Total Number of Containers: 31
Printed Name: Craig Lovdahl S.S. / Time	Printed Name: Cole Aldin / Date	Printed Name: B. Lucas / Time	Printed Name / Date	Chain of Custody Seals: yes
Company: AeroVironment / Date: 11/14/86	Company	Company / Date	Company	Rec'd Good Condition/Cold: OK
				Conforms to Record: yes
				Lab No. 8611-043

WHITE COPY: LABORATORY   CANARY COPY: AEROVIRONMENT

AV-1-OA-1X

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SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

8611-044 Pg 1 . 2

SITE Mather

AV PROJECT NO. 104/6L

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO:

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE	PET. HC 418.1	MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES PCB 608 8080	MUST BE EXTRACTED BY THIS DATE	ANIONS	MUST BE ANAL/EXT BY THIS DATE	TDS	MUST BE ANAL/EXT BY THIS DATE	ALKALINITY	MUST BE ANAL/EXT BY THIS DATE	TOTAL CN-	TOTAL PHENOLS	PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8) ICP	ICP MINERALS Ca, Fe, Mg, K, Na	NUMBER OF SAMPLE CONTAINERS
000778	11/15	1035		✓	11/29	✓	11/22									✓	11/17	✓	11/17	✓	11/29						✓	5
000779	11/15	1200		✓		✓										✓		✓		✓							✓	5
780	11/15	1420		✓		✓										✓		✓		✓							✓	5
781	11/15	1615		✓		✓										✓		✓		✓							✓	5
783	11/15	1745		✓		✓										✓		✓		✓							✓	5
784	11/15	1840		✓		✓				✓	12/13					✓		✓		✓		✓	✓			✓	✓	8
785	11/16	1030		✓	11/30	✓	11/23			✓	12/14					✓	11/18	✓	11/18	✓	11/30	✓	✓			✓	✓	8
786	11/16	1145		✓		✓				✓						✓		✓		✓		✓	✓			✓	✓	8
787	11/16	1545		✓		✓				✓						✓		✓		✓		✓	✓			✓	✓	8
788	11/16	1640		✓		✓				✓						✓		✓		✓		✓	✓			✓	✓	8

DO NOT EXCEED THESE HOLDING TIMES (Halogen Volatiles through Purgeables) · MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION (Pet. HC through Pesticides) · MUST BE ANALYZED WITHIN 28 DAYS (Priority Pollutant Metals through ICP Minerals)

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT
Signature [signature]	Signature	Signature	Signature Efren A. Sablan · Time 1041	Total Number of Containers: 70
Printed Name C. W. Lundahl · Time 6:10p	Printed Name Greyhound · Time	Printed Name Bus Lines · Time	Printed Name Efren A. Sablan · Date 11/17/86	Chain of Custody Seals: yes
Company AeroVironment · Date 11/16/86	Company · Date	Company · Date	Company Acurex Lab	Rec'd Good Condition/Cold: ok
				Conforms to Record: yes
				Lab No. 8611-044

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AV-F-QA-18

86 11-044 Pg 2 2

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SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE MATHER AFB

AV PROJECT NO. 104/16L

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO:

DO NOT EXCEED THESE HOLDING TIMES: Halogen Volatiles through Must be analyzed by this date (after Purgeables)

MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION: Pet. HC 418.1 through Must be extracted by this date (after Pesticides/PCB)

(BOTH): Anions through Alkalinity

MUST BE ANALYZED WITHIN 28 DAYS: Priority Pollutant Metals (13) through ICP Metals Fe, Mn, Mg, K, Na, Ca

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/5020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE	PET. HC 418.1	MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES/PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	ANIONS	MUST BE ANAL/EXT. BY THIS DATE	TDS	MUST BE ANAL/EXT. BY THIS DATE	ALKALINITY	MUST BE ANAL/EXT. BY THIS DATE	TOTAL CN	TOTAL PHENOLS	PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8)	ICP METALS Fe, Mn, Mg, K, Na, Ca	NUMBER OF SAMPLE CONTAINERS
000789	11/16	1715		✓	11/30	✓	11/23			✓	12/14					✓	11/13	✓	11/13	✓	11/30	✓	✓			✓	✓	8
000775	11/14	1410														✓	11/16	✓	11/16	✓	11/28						✓	

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)
Signature: [signature]	Signature:	Signature:	Signature: [signature] Time: 1045
Printed Name: C.W. LUNDAHL Time: 6:10	Printed Name: GREYHOUND Date:	Printed Name: BUS LINES Time:	Printed Name: ERNEST A. SABLAN Date: 11/17/86
Company: AeroVironment Date: 11/16/86	Company:	Company: Date:	Company: ACUREX LAB

SAMPLE RECEIPT	
Total Number of Containers	11
Chain of Custody Seals	yes
Rec'd Good Condition/Cold	OK
Conforms to Record	yes
Lab No.	8611-044

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Pg _11_

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SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE: MATHER AFB

AV PROJECT NO. 104166

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO: C. Lowman

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DO NOT EXCEED THESE HOLDING TIMES: Halogen Volatiles 601/8010; Arom. Volatiles 602/8020; Purgeables GC/MS 624/8240

MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION: Pet HC 418.1; Base/Neutral Acids GC/MS 625/8270; Pesticides PCB 608/8080

MUST BE ANALYZED WITHIN 28 DAYS: Priority Pollutant Metals (13); CAM Metals TTLC/STLC; EP Tox Metals (8) ICP; ICP Minerals - Fe, Mn, ...

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE	PET HC 418.1	MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	SOLIDS	MUST BE ANAL. EXT. BY THIS DATE	TDS	MUST BE ANAL. EXT. BY THIS DATE	ALKALINITY	MUST BE ANAL. EXT. BY THIS DATE	TOTAL CN	TOTAL PHENOLS	PRIORITY POLLUTANT METALS (13)	CAM METALS TTLC/STLC	EP TOX METALS (8) ICP	ICP MINERALS - Fe, Mn	NUMBER OF SAMPLE CONTAINERS
(NO PET HC) 000790	11/17	1115		✓	12/1	✓	12/24			✓	12/15					✓	11/19	✓	11/19	✓	12/1	✓	[illegible]			✓	✓	7
791	11/17	1145		✓		✓				✓						✓		✓		✓		✓	✓			✓	✓	8
792	11/17	1245		✓		✓				✓						✓		✓		✓		✓	✓			✓	✓	8
793	11/17	1345		✓		✓				✓						✓		✓		✓		✓	✓			✓	✓	8
794	11/17	1530		✓		✓				✓						✓		✓		✓		✓	✓			✓	✓	8
(NO PET HC) 795	11/17	1615		✓		✓				[illegible]						✓		✓		✓		✓	✓			✓	✓	7

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)
Signature: [signature]	Signature:	Signature:	Signature: Efren A. Sablan 1105
Printed Name: C. Lowman Go	Printed Name: Greyhound	Printed Name: Bus Lines	Printed Name: EFREN A. SABLAN
Company: AeroVironment	Company:	Company:	Company: Acumen Labs
Date: 11/17/86	Date:	Date:	Date/Time: 11/18/86

SAMPLE RECEIPT	OK 11/18/86
Total Number of Containers	46
Chain of Custody Seals	Yes
Rec'd Good Condition/Cold	Yes
Conforms to Record	NO

8611-046

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AV F-OA 18

2 COOLERS THIS SHIPMENT SAMPLE 1/1

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SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE MAMMOTH IRP

AV PROJECT NO. 10416 L

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO:

DO NOT EXCEED THESE HOLDING TIMES | MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION | MUST BE ANALYZED WITHIN 28 DAYS

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE	PET HC 418.1	MUST BE EXTRACTED BY THIS DATE	BASE NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	ANIONS	MUST BE ANAL EXT BY THIS DATE	TDS	MUST BE ANAL EXT BY THIS DATE	ALKALINITY	MUST BE ANAL EXT BY THIS DATE	TOTAL CN-	TOTAL PHENOLS	PRIORITY POLLUTANT METALS (13)	CAM METALS TTLC STLC	EP TOX METALS (8) ICP	ICP METALS	REMAINING SAMPLE	NUMBER OF SAMPLE CONTAINERS
00796	11/18	930		✓	12/2	✓	11/25			✓	12/16					✓	11/20	✓	11/30	✓	12/2	✓	✓			✓	✓		8
797	11/18	1045		✓		✓				✓						✓		✓				✓	✓			✓	✓		8
798	11/18	1130		✓		✓				✓				-		✓		✓				✓	✓			✓	✓		8
799	11/18	1145		✓		✓				✓						✓		✓				✓	✓			✓	✓		8
800	11/18	1245		✓		✓				✓						✓		✓				✓	✓			✓	✓		8
801	11/18	1300		✓		✓				✓						✓		✓				✓	✓			✓	✓		8
[redacted]																													
790	11/17	1115								✓	12/17																		1
795	11/17	1615																					✓						1

Transfer 8611-047

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY) 1050
Signature	Signature / Time	Signature	Signature: Efren A. Sablan / Time 11/18/86
C. N. LUNDAHL 2:45p / Printed Name / Time	COREY / HOWARD / Printed Name / Date	BOB L... / Printed Name / Time	EFREN A. SABLAN / Printed Name / Date
AeroVironment / Company / Date 11/18/86	Company	Company / Date	ACUREX LAB / Company

SAMPLE RECEIPT	01
Total Number of Containers	37
Chain of Custody Seals	OK
Rec'd Good Condition/Cold	OK
Conforms to Record	OK
Lab No.	8611-050

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AV-F-QA-18

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SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD 8612-014

SITE MATHER AFB

AV PROJECT NO. 104/16L

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO:

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	DO NOT EXCEED THESE HOLDING TIMES: HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE	MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION:	MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	ALKALINITY Sm 403	MUST BE ANAL/EXT BY THIS DATE	TDS - EPA 160.1	MUST BE ANAL/EXT BY THIS DATE	ANIONS - Sm 429	MUST BE ANAL/EXT BY THIS DATE			MUST BE ANALYZED WITHIN 28 DAYS: PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8)	Mn, Mg, Ca, Na, K, Fe by ICP	NUMBER OF SAMPLE CONTAINERS
000601	12/8	1300		✓	12/22	✓	12/15									✓	12/22	✓	12/10	✓	12/10						✓	5
602	12/8	1415		✓	↓	✓	↓									✓	↓	✓	↓	✓	↓						✓	5
603	12/8	1515		✓	↓	✓	↓									✓	↓	✓	↓	✓	↓						✓	5
604	12/8	1645		✓	↓	✓	↓									✓	↓	✓	↓	✓	↓						✓	5

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT	
Signature [signature]	Signature Time	Signature	Signature Efren A. Sablan Time 1135	Total Number of Containers	10
Printed Name C. W. LUDAHL Time 6:00	Printed Name GREYHOUND Date	Printed Name BUS LINES Time	Printed Name EFREN A. SABLAN Date 12/09/86	Chain of Custody Seals	OK
Company AEROVIRONMENT Date 12/8/86	Company	Company Date	Company ACUREX LAB	Rec'd Good Condition/Cold	OK
				Conforms to Record	OK
				Lab No. 8612-014	

WHITE COPY - LABORATORY
RETURN TO AEROVIRONMENT

CANARY COPY - AEROVIRONMENT

AV F-...

8612-015

SHEET 1 of 1 2 COOLERS, SHIPMENT

AeroVironment Inc.
825 Myrtle Avenue · Monrovia, California 91016
Telephone 818/ 357-9983

SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE MATHER AFB

AV PROJECT NO. 104/16L

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO: 1st ROUND SAMPLE ID)

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

SAMPLE NUMBER	DATE M/D	24 HR. TIME	ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES/PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	ALKALINITY Sm 402	MUST BE ANAL/EXT BY THIS DATE	TDS - EPA 160.	MUST BE ANAL/EXT BY THIS DATE	ANIONS SM429	MUST BE ANAL/EXT BY THIS DATE	TOTAL CN		PRIORITY POLLUTANT METALS (13)	CAM METALS (TTLC/STLC)	EP TOX METALS	Mn Mg Ni Fe Ca K Na ICP	NUMBER OF SAMPLE CONTAINERS
000605	12/9	725	769	✓	12/23	✓	12/16									✓	12/23	✓	12/11	✓	12/11						✓	5
606	12/9	830	771	✓		✓										✓		✓		✓							✓	5
607	12/9	935	773	✓		✓										✓		✓		✓							✓	5
608	12/9	950	NA	✓		✓										✓		✓		✓							✓	5
609	12/9	1050	774	✓		✓										✓		✓		✓							✓	5
610	12/9	1140	785	✓		✓										✓		✓		✓		✓				✓	✓	6
611	12/9	1240	786	✓		✓										✓		✓		✓		✓				✓	✓	6
612	12/9	1500	795	✓		✓										✓		✓		✓		✓				✓	✓	6
613	12/9	1600	79?	✓		✓										✓		✓		✓		✓				✓	✓	6
614	12/9	1700	787	✓		✓										✓		✓		✓		✓				✓	✓	6

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT
Signature [signature]	Signature Time	Signature	Signature [signature] Time	Total Number of Containers
Printed Name C.W. LONDAHL 6:10p Time	Printed Name GREYHOUND Date	Printed Name BUS LINES Time	Printed Name [illegible] Date	Chain of Custody Seals
Company AEROVIRONMENT Date 12/9/86	Company	Company Date	Company [illegible]	Rec'd Good Condition/Cold
				Conforms to Record
				8612-015

WHITE COPY - LABORATORY   ... COPY - AEROVIRONMENT   AV F-...

Page 1 of ?

AeroVironment Inc.
825 Myrtle Avenue · Monrovia California 91016
Telephone 818/357-9983

SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE Mather AFB

AV PROJECT NO. 104106

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO: 1st Round Sample I.D.

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DO NOT EXCEED THESE HOLDING TIMES | MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION | MUST BE ANALYZED WITHIN 28 DAYS

SAMPLE NUMBER	DATE M/D	24 HR. TIME	~~LAB~~ ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC MS 624/8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL/ACIDS GC MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES/PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	Alkalinity Sm 403	MUST BE ANAL/EXT BY THIS DATE	TDS-EPA 160.1	MUST BE ANAL/EXT BY THIS DATE	ANIONS SM 409	MUST BE ANAL/EXT BY THIS DATE			PRIORITY POLLUTANT METALS	CAM METALS	EP TOX METALS	Mn, Mg, Na, Fe, Ca, K, By ICP	NUMBER OF SAMPLE CONTAINERS
000615	12/10	0745	779	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	5
00616	12/10	0945	776	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	5
000617	12/10	1020	778	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	5
00618	12/10	1115	775	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	5
00619	12/10	1400	780	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	5
00620	12/10	1500	781	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	5
00621	12/10	1250	—	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	4
00622	12/10	1535	—	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	4
00623	12/10	1435	—	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	4
00624	12/10	1335	—	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	4

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT
Signature: Sheryl A Thurston	Signature: ___ Time: ___	Signature: ___	Signature: [illegible] Time: 1/10	Total Number of Containers: 62
Printed Name: Sheryl Thurston Time: 6pm	Printed Name: ___ Date: ___	Printed Name: ___ Time: ___	Printed Name: [illegible] A. Sablan Date: 12/11/82	Chain of Custody Seals: Yes
Company: AeroVironment Date: 12/10	Company: ___	Company: ___ Date: ___	Company: Acurex Lab	Rec'd Good Condition/Cold: OK
				Conforms to Record: Yes
				Lab No. 8612-01

Page 2 of 2

AeroVironment Inc.
825 Myrtle Avenue · Monrovia, California 91016
Telephone 818/357-9983

SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE Mather AFB

AV PROJECT NO. 10416L

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO:

				DO NOT EXCEED THESE HOLDING TIMES						MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION														MUST BE ANALYZED WITHIN 28 DAYS				
SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES/PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	Alkalinity Sm 403	MUST BE ANAL/EXT BY THIS DATE	TDS EPA 160.1	MUST BE ANAL/EXT BY THIS DATE	Anions Sm 409	MUST BE ANAL/EXT. BY THIS DATE			PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8)	Mn, Mg, Na, Fe, Ca, K By ICP	NUMBER OF SAMPLE CONTAINERS
000625	12/10	1550	—	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	4
000626	12/10	1415	—	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	4
000627	12/10	1320	—	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	4
000628	12/10	1230	—	✓	12/24	✓	12/17									✓	12/24	✓	12/12	✓	12/12						✓	4

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT	
Signature: Sheryl A Thurston	Signature:	Signature:	Signature: Eileen A. Sablan, Time: 1110	Total Number of Containers	
Printed Name: Sheryl A Thurston, Time: 6pm	Printed Name: , Time:	Printed Name: , Time:	Printed Name: Eileen A. Sablan, Date: 12/11/86	Chain of Custody Seals	yes
Company: AeroVironment, Date: 12/10	Company: , Date:	Company: , Date:	Company: Acurex Lab	Rec'd Good Condition/Cold	OK
				Conforms to Record	yes
				Lab No.	8612[illegible]019

WHITE COPY – LABORATORY CANARY COPY – AEROVIRONMENT

2 COOLERS IN THIS SHIPMENT

AeroVironment Inc.
825 Myrtle Avenue · Monrovia, California 91016
Telephone 818/357-9983

SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE Mather

AV PROJECT NO. 10416L

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO:

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DO NOT EXCEED THESE HOLDING TIMES | MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION | MUST BE ANALYZED WITHIN 28 DAYS

SAMPLE NUMBER	DATE M/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC MS 624 8240	MUST BE ANALYZED BY THIS DATE	Petroleum HC	MUST BE EXTRACTED BY THIS DATE	BASE NEUTRAL/ACIDS GC MS 625 8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES PCB 608 8080	MUST BE EXTRACTED BY THIS DATE	Alkalinity SM 403	MUST BE ANAL/EXT BY THIS DATE	TDS-EPA 160.1	MUST BE ANAL/EXT BY THIS DATE	ANIONS SM 409	MUST BE ANAL/EXT BY THIS DATE	Phenols	must be extracted by	PRIORITY POLLUTANT METALS	CAM METALS TTLC STLC	EP TOX METALS	Mn, Mg, Na, Fe, Ca, K, ICP	NUMBER OF SAMPLE CONTAINERS
000629	12/11	0750	788	✓	12/25	✓	12/18			~~✓~~	~~1/7~~					✓	12/25	✓	12/13	✓	12/13	~~✓~~	~~1/7~~			✓	✓	6
000630	12/11	0810	N/A	✓	12/25	✓	12/18			~~✓~~	~~1/7~~					✓	12/25	✓	12/13	✓	12/13	~~✓~~	~~1/7~~			✓	✓	6
000631	12/11	0850	789	✓	12/25	✓	12/18			~~✓~~	~~1/7~~					✓	12/25	✓	12/13	✓	12/13	~~✓~~	~~1/7~~			✓	✓	6
000632	12/11	0950	796	✓	12/25	✓	12/18			~~✓~~	~~1/7~~					✓	12/25	✓	12/13	✓	12/13	~~✓~~	~~1/7~~			✓	✓	6
000633	12/11	1045	797	✓	12/25	✓	12/18			~~✓~~	~~1/7~~					✓	12/25	✓	12/13	✓	12/13	~~✓~~	~~1/7~~			✓	✓	6
000634	12/11	1245	798	✓	12/25	✓	12/18			~~✓~~	~~1/7~~					✓	12/25	✓	12/13	✓	12/13	~~✓~~	~~1/7~~			✓	✓	6
000635	12/11	1340	800	✓	12/25	✓	12/18			~~✓~~	~~1/7~~					✓	12/25	✓	12/13	✓	12/13	~~✓~~	~~1/7~~			✓	✓	6
000636	12/11	1420	N/A	✓	12/25	✓	12/18			~~✓~~	~~1/7~~					✓	12/25	✓	12/13	✓	12/13	~~✓~~	~~1/7~~			✓	✓	6
000637	12/11	1510	792	✓	12/25	✓	12/18			~~✓~~	~~1/7~~					✓	12/25	✓	12/13	✓	12/13	~~✓~~	~~1/7~~			✓	✓	6
000638	12/11	1605	790	✓	12/25	✓	12/18			✓	1/7					✓	12/25	✓	12/13	✓	12/13	✓	1/7			✓	✓	5

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)
Signature: Sheryl A. Thurston	Signature ___ Time ___	Signature ___ Time ___	Signature: Efren A. Sablan Time: 1110
Printed Name: Sheryl Thurston Time: 6pm	Printed Name ___ Date ___	Printed Name ___ Time ___	Printed Name: EFREN A. SABLAN Date: 12/12/86
Company: AeroVironment Date: 12/11/86	Company ___	Company ___ Date ___	Company: Acurex LAB

SAMPLE RECEIPT	
Total Number of Containers	62
Chain of Custody Seals	YES
Rec'd Good Condition/Cold	OK
Conforms to Record	yes

8612-020

WHITE — [illegible] LABORATORY   CANARY — [illegible] AEROVIRONMENT

AV [illegible]

page 1 of 1

AeroVironment Inc.
825 Myrtle Avenue · Monrovia California 91016
Telephone 818/357 9983

SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

SITE Mather

AV PROJECT NO. 104162

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO:

DO NOT EXCEED THESE HOLDING TIMES | MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION | MUST BE ANALYZED WITHIN 28 DAYS

SAMPLE NUMBER	DATE W/D	24 HR. TIME	LAB ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL/ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES/PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	Alkalinity Sm 403	MUST BE ANAL/EXT BY THIS DATE	TDS- EPA 160.1	MUST BE ANAL/EXT. BY THIS DATE	ANIONS	MUST BE ANAL/EXT. BY THIS DATE	Total CN-	must be analyzed by this date	PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8)	Mn Mg Na Fe Ca, K, B, ICP	NUMBER OF SAMPLE CONTAINERS
00639	12/12	0715	793	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14	✓	12/26			✓	✓	6
00640	12/12	0915	784	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14	✓	12/26			✓	✓	6
00641	12/12	0935	N/A	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14	✓	12/26			✓	✓	6
00642	12/12	1045	783	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
00643	12/12	1215	753	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	6
00644	12/12	1245	752	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
00645	12/12	1430	754	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
00646	12/12	1600	755	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
00647	12/12	1500	N/A	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
00648	12/12	1535	N/A	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)	SAMPLE RECEIPT
Signature: Sheryl Thurston	Signature:	Signature:	Signature: Greg Nicoll Time: 1640	Total Number of Containers: 5
Printed Name: Sheryl Thurston Time: 6pm	Printed Name: Greyhound Bus Lines Date:	Printed Name: Time:	Printed Name: Greg Nicoll Date: 12-13-86	Chain of Custody Seals: ✓
Company: AeroVironment Date: 12/12/86	Company:	Company: Date:	Company: Anatex Corp.	Rec'd Good Condition/Cold: ✓
				Conforms to Record:
				Lab No.: 8612-022

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AeroVironment Inc.
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Telephone 818/357-9983

SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE Mather

AV PROJECT NO. 10416L

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO: Round 1 sample #2

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

				DO NOT EXCEED THESE HOLDING TIMES						MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION														MUST BE ANALYZED WITHIN 28 DAYS				
SAMPLE NUMBER	DATE M/D	24 HR. TIME	~~LAB~~ ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL/ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES/PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	Alkalinity sm 403	MUST BE ANAL/EXT BY THIS DATE	TDS - EPA 160.1	MUST BE ANAL/EXT. BY THIS DATE	Anions sm 409	MUST BE ANAL/EXT. BY THIS DATE			PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8)	Mn, Mg, Si, Fe	NUMBER OF SAMPLE CONTAINERS
000649	12/13	0715	756	✓	12/26	✓	12/19									✓	12/16	✓	12/14	✓	12/14						✓	5
000650	12/13	0855	757	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
000651	12/13	0955	763	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
000652	12/13	1015	N/A	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
000653	12/13	1050	751	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
000654	12/13	1220	765	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
000655	12/13	1420	760	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
000656	12/13	1500	761	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
000657	12/13	1540	759	✓	12/26	✓	12/19									✓	12/26	✓	12/14	✓	12/14						✓	5
000658	12/14	0810	764	✓	12/27	✓	12/20									✓	12/[illegible]	✓	12/15	✓	12/15						✓	5

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)
Signature: Sheryl Thurston	Signature: Time:	Signature:	Signature: Glen S. Allan Time: 11:20
Printed Name: Sheryl Thurston Rep. Time:	Printed Name: Greyhound Bus Lines Date:	Printed Name: Time:	Printed Name: Ernest A. Sablan Date: 12/15/82
Company: AeroVironment Date: 12/14/82	Company:	Company: Date:	Company: Acurex Lab

SAMPLE RECEIPT	
Total Number of Containers	65 with cooler
Chain of Custody Seals	Yes
Rec'd Good Condition/Cold	ok
Conforms to Record	yes
Lab No.	8612-023

WHITE COPY - LABORATORY · CANARY COPY - AEROVIRONMENT · PINK COPY - AEROVIRONMENT

AV F OA 18

P 2 of 2

AeroVironment Inc.
825 Myrtle Avenue • Monrovia, California 91016
Telephone 818/357-9983

SAMPLE SUBMITTAL FORM/CHAIN OF CUSTODY RECORD

SITE Mather

AV PROJECT NO. 104161

DISPOSE OF SAMPLES ___ DAYS AFTER REPORTING ANALYSIS

SEND RESULTS TO: Round 1 sample #

PLEASE REPORT DATE ANALYZED (AND TIME WHERE NECESSARY) WITH ANALYTICAL RESULTS

DO NOT EXCEED THESE HOLDING TIMES | MUST BE ANALYZED WITHIN 40 DAYS AFTER EXTRACTION | MUST BE ANALYZED WITHIN 28 DAYS

SAMPLE NUMBER	DATE M/D	24 HR. TIME	~~LAB~~ ID	HALOGEN VOLATILES 601/8010	MUST BE ANALYZED BY THIS DATE	AROM. VOLATILES 602/8020	MUST BE ANALYZED BY THIS DATE	PURGEABLES GC/MS 624/8240	MUST BE ANALYZED BY THIS DATE		MUST BE EXTRACTED BY THIS DATE	BASE/NEUTRAL ACIDS GC/MS 625/8270	MUST BE EXTRACTED BY THIS DATE	PESTICIDES/PCB 608/8080	MUST BE EXTRACTED BY THIS DATE	Alkalinity SM403	MUST BE ANAL/EXT BY THIS DATE	TDS-EPA 160.1	MUST BE ANAL/EXT. BY THIS DATE	Anions SM 429	MUST BE ANAL/EXT. BY THIS DATE			PRIORITY POLLUTANT METALS (13)	CAM METALS (17) TTLC/STLC	EP TOX METALS (8)	Mn, Mg, Na, Ca, K, Fe, B, Li	NUMBER OF SAMPLE CONTAINERS
000659	12/14	0830	N/A	✓	12/[illegible]	✓	12/20									✓	12/27	✓	12/15	✓	12/15						✓	5
000660	12/14	0750	N/A	✓	12/[illegible]	✓	12/20									✓	12/27	✓	12/15	✓	12/15						✓	5
000661	12/14	0850	758	✓	12/[illegible]	✓	12/20									✓	12/27	✓	12/15	✓	12/15						✓	5

COLLECTED/RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY (LABORATORY)
Signature: Sheryl Murdon	Signature ___ Time ___	Signature ___	Signature: Eileen A. Sablan Time: 1120
Printed Name: Sheryl Murston Time: 12pm	Printed Name: Greyhound Bus Lines Date ___	Printed Name ___ Time ___	Printed Name: EILEEN A. SABLAN Date: 12/17/86
Company: AeroVironment Date: 12/14/86	Company ___	Company ___ Date ___	Company: Acurex Lab

SAMPLE RECEIPT	
Total Number of Containers	
Chain of Custody Seals	Yes
Rec'd Good Condition/Cold	Ok
Conforms to Record	Yes
Lab No.	8612-023

WHITE COPY - LABORATORY   CANARY COPY - AEROVIRONMENT   AV F OA 18

ENVIRONMENTAL SAMPLING DATA

OEHL USE ONLY

Use this space for mechanical imprint

SAMPLING SITE IDENTIFIER (AFR 1…): 0 1 … 7 X X

BASE WHERE SAMPLE COLLECTED: MATHER AFB

SAMPLING SITE DESCRIPTION: AC… D14-…

DATE COLLECTION BEGAN (YYMMDD)	TIME COLLECTION BEGAN (24 hour clock)	COLLECTION METHOD
86 … 1 1 2 4	12…	✓ GRAB ☐ COMPOSITE ______ HOURS

MAIL REPORTS TO (circle if changed)		
	ORIGINAL	… / T…
	COPY 1	
	COPY 2	

SAMPLE COLLECTED BY (Name, Grade, AFSC): … SIGNATURE: … AUTOVON:

REASON FOR SUBMISSION: ? A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify)

BASE SAMPLE NUMBER: 6 … 0390 OEHL PIG

ANALYSES REQUESTED (check appropriate blocks)

GROUP A						GROUP T	
Ammonia	00610	Hardness	00900	Residue, Settleable	50086	Bromoform	32104
Chemical Oxygen Demand	00340	Iron	01045	Residue, Volatile	00505	Bromodichloromethane	32101
Kjeldahl Nitrogen	00625	Lead	01051	Silica	00955	Carbon Tetrachloride	32102
Nitrate	00620	Magnesium	00927	Specific Conductance	00095	Chloroform	32106
Nitrite	00615	Manganese	01055	Sulfate	00945	Chloromethane	34418
Oil & Grease	00560	Mercury	71900	Sulfite	00740	Dibromochloromethane	32105
Organic Carbon	00680	Nickel	01067	Surfactants -MBAS	38260	Methylene Chloride	344…
Orthophosphate	00671	Potassium	00937	Turbidity	00076	Tetrachloroethylene	344…
Phosphorus, Total	00665	Selenium	01147			1,1,1-Trichloroethane	345…
		Silver	01077			Trichloroethylene	391…
GROUP D		Sodium	00929	GROUP H		Trihalomethanes	…
Cyanide, Total	00720	Thallium	01059	BHC Isomers	39340	PCBs	…
Cyanide, Free	00722	Zinc	01092	Chlordane	39350	X …	
				DDT Isomers	39370	X AN…	
GROUP E		GROUP G		Dieldrin	39380		
Phenols	32730			Endrin	39390	X …	
		Acidity, Total	70508	Heptachlor	39410	… EPA … 7	
GROUP F		X Alkalinity, Total	00410	Heptachlor Epoxide	39420		
Antimony	01097	X Alkalinity, Bicarbonate	00425	Lindane	39782		
Arsenic	01002	Bromide	71870	Methoxychlor	39480		
Barium	01007	Carbon Dioxide	00405	Toxaphene	39400		
Beryllium	01012	Chloride	00940	2,4-D	39730		
Boron	01022	Color	00080	2,4,5-TP-Silvex	39760		
Cadmium	01027	Fluoride	00951	2,4,5-T	39740		
Calcium	00916	Iodide	71865				
Chromium, Total	01034	Odor	00086				
Chromium VI	01032	Residue, Total	00500				
Copper	01042	X Residue, Filterable (TDS)	70300	GROUP J			
		Residue, Nonfilterable	00530	Sulfides	00745		

ON SITE ANALYSES

Parameter		Value
Flow	50050	mgd
Chlorine, Total	50060	mg/l
Dissolved Oxygen	00300	mg/l
pH	00400	units
Temperature	00010	°C

COMMENTS: AV - 760

AF FORM JAN 81 2752

ENVIRONMENTAL SAMPLING DATA

OEHL USE ONLY

SAMPLING SITE IDENTIFIER (AFR 19-7): 0117 X1

BASE WHERE SAMPLE COLLECTED: MATSR

SAMPLING SITE DESCRIPTION: 7LD Disposal

DATE COLLECTION BEGAN (YYMMDD): 84 12 11

TIME COLLECTION BEGAN (24 hour clock): 1605

COLLECTION METHOD: GRAB COMPOSITE ______ HOURS

MAIL REPORTS TO (circle if changed)	
ORIGINAL	USAF OEHL/TS Brooks AFB TX
COPY 1	
COPY 2	

SAMPLE COLLECTED BY (Name, Grade, AFSC): [illegible]

SIGNATURE: [illegible]

AUTOVON:

REASON FOR SUBMISSION: A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify) IICP WA

BASE SAMPLE NUMBER: 62 BG 0457

OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

GROUP A		Hardness	00900	Residue, Settleable	50086	GROUP T	
Ammonia	00610	Iron	01045	Residue, Volatile	00505	Bromoform	32104
Chemical Oxygen Demand	00340	Lead	01051	Silica	00955	Bromodichloromethane	32101
Kjeldahl Nitrogen	00625	Magnesium	00927	Specific Conductance	00095	Carbon Tetrachloride	32102
Nitrate	00620	Manganese	01055	Sulfate	00945	Chloroform	32106
Nitrite	00615	Mercury	71900	Sulfite	00740	Chloromethane	34418
Oil & Grease	00560	Nickel	01067	Surfactants -MBAS	38260	Dibromochloromethane	32105
Organic Carbon	00680	Potassium	00937	Turbidity	00076	Methylene Chloride	[illegible]
Orthophosphate	00671	Selenium	01147			Tetrachloroethylene	[illegible]
Phosphorus, Total	00665	Silver	01077			1,1,1-Trichloroethane	34506
		Sodium	00929	GROUP H		Trichloroethylene	39180
GROUP D		Thallium	01059	BHC Isomers	39340	Trihalomethanes	82080
Cyanide, Total	00720	Zinc	01092	Chlordane	39350	PCBs	39516
Cyanide, Free	00722			DDT Isomers	39370	X [illegible]	
				Dieldrin	39380	X [illegible]	
GROUP E		GROUP G		Endrin	39390	CARB [illegible]	
Phenols	32730	Acidity, Total	70508	Heptachlor	39410		
		Alkalinity, Total	00410	Heptachlor Epoxide	39420		
GROUP F		Alkalinity, Bicarbonate	00425	Lindane	39782		
Antimony	01097	Bromide	71870	Methoxychlor	39480		
Arsenic	01002	Carbon Dioxide	00405	Toxaphene	39400		
Barium	01007	Chloride	00940	2,4-D	39730	ON SITE ANALYSES	
Beryllium	01012	Color	00080	2,4,5-TP-Silvex	39760	Parameter	Value
Boron	01022	Fluoride	00951	2,4,5-T	39740	Flow 50050	mgd
Cadmium	01027	Iodide	71865			Chlorine, Total 50060	mg/l
Calcium	00916	Odor	00086			Dissolved Oxygen 00300	mg/l
Chromium, Total	01034	Residue, Total	00500			pH 00400	units
Chromium VI	01032	Residue, Filterable (TDS)	70300	GROUP J		Temperature 00010	°C
Copper	01042	Residue, Nonfilterable	00530	Sulfides	00745		

COMMENTS: AVH 638

AF FORM 2752 JAN 81

ENVIRONMENTAL SAMPLING DATA

OEHL USE ONLY

Use this space for mechanical imprint)

SAMPLING SITE IDENTIFIER (AFR 19-7)	U 1 2 7 X X
BASE WHERE SAMPLE COLLECTED	MATHER
SAMPLING SITE DESCRIPTION	7105 DISPOSAL

DATE COLLECTION BEGAN (YYMMDD)	TIME COLLECTION BEGAN (24 hour clock)	COLLECTION METHOD
86 1 1 2 1	0715	GRAB / COMPOSITE ______ HOURS

MAIL REPORTS TO (circle if changed)		
	ORIGINAL	USAF OEHL / BROOKS AFB
	COPY 1	
	COPY 2	

SAMPLE COLLECTED BY (Name, Grade, AFSC)	SIGNATURE	AUTOVON
THURSTON / LOVDAHL		

REASON FOR SUBMISSION: A-ACCIDENT/INCIDENT · R-ROUTINE/PERIODIC · C-COMPLAINT · N-NPDES · F-FOLLOWUP/CLEANUP · O-OTHER (specify)

BASE SAMPLE NUMBER: C N 8 6 0 1 5 6 OEHL PID

ANALYSES REQUESTED *(check appropriate blocks)*

Parameter	Code	Parameter	Code	Parameter	Code	Parameter	Code
GROUP A		✓ Hardness	00900	Residue, Settleable	50086	**GROUP T**	
Ammonia	00610	✓ Iron	01045	Residue, Volatile	00505	Bromoform	32104
Chemical Oxygen Demand	00340	✓ Lead	01051	Silica	00955	Bromodichloromethane	32101
Kjeldahl Nitrogen	00625	✓ Magnesium	00927	Specific Conductance	00095	Carbon Tetrachloride	32102
Nitrate	00620	✓ Manganese	01055	Sulfate	00945	Chloroform	32106
Nitrite	00615	✓ Mercury	71900	Sulfite	00740	Chloromethane	34418
Oil & Grease	00560	Nickel	01067	Surfactants -MBAS	38260	Dibromochloromethane	32105
Organic Carbon	00680	✓ Potassium	00937	Turbidity	00076	Methylene Chloride	34423
Orthophosphate	00671	✓ Selenium	01147			Tetrachloroethylene	34475
Phosphorus, Total	00665	✓ Silver	01077			1,1,1-Trichloroethane	34506
		✓ Sodium	00929	**GROUP H**		Trichloroethylene	39180
GROUP D		Thallium	01059	BHC Isomers	39340	Trihalomethanes	82080
✓ Cyanide, Total	00720	Zinc	01092	Chlordane	39350	PCBs	39516
Cyanide, Free	00722			DDT Isomers	39370	X VOC [illegible]	
				Dieldrin	39380	X ANIONS [illegible]	
GROUP E		**GROUP G**		Endrin	39390		
Phenols	32730	✓ Acidity, Total	70508	Heptachlor	39410		
		✓ Alkalinity, Total	00410	Heptachlor Epoxide	39420		
GROUP F		Alkalinity, Bicarbonate	00425	Lindane	39782		
Antimony	01097	Bromide	71870	Methoxychlor	39480		
✓ Arsenic	01002	Carbon Dioxide	00405	Toxaphene	39400		
✓ Barium	01007	Chloride	00940	2,4-D	39730	**ON SITE ANALYSES**	
Beryllium	01012	Color	00080	2,4,5-TP-Silvex	39760	Parameter	Value
Boron	01022	Fluoride	00951	2,4,5-T	39740	Flow 50050	mgd
✓ Cadmium	01027	Iodide	71865			Chlorine, Total 50060	mg/l
✓ Calcium	00916	Odor	00086			Dissolved Oxygen 00300	mg/l
✓ Chromium, Total	01034	Residue, Total	00500			pH 00400	units
Chromium VI	01032	✓ Residue, Filterable (TDS)	70300	**GROUP J**		Temperature 00010	°C
Copper	01042	Residue, Nonfilterable	00530	Sulfides	00745		

COMMENTS

AV 3639

AF FORM JAN 81 2752

ENVIRONMENTAL SAMPLING DATA

OEHL USE ONLY

Use this space for mechanical imprint

SAMPLING SITE IDENTIFIER (AFR 19-7): 0127 XX

BASE WHERE SAMPLE COLLECTED: MATHER AFB

SAMPLING SITE DESCRIPTION: 7100 DISPOSAL AREA

DATE COLLECTION BEGAN (YYMMDD): 86 12

TIME COLLECTION BEGAN (24 hour clock): 1045

COLLECTION METHOD: ✓ GRAB — COMPOSITE ______ HOURS

MAIL REPORTS TO (circle if changed): ORIGINAL — USAF OEHL/TS BROOKS AFB, TX; COPY 1; COPY 2

SAMPLE COLLECTED BY (Name, Grade, AFSC): [illegible]

SIGNATURE: [illegible]

AUTOVON:

REASON FOR SUBMISSION: B — A-ACCIDENT/INCIDENT, B-ROUTINE/PERIODIC, C-COMPLAINT, N-NPDES, F-FOLLOWUP/CLEANUP, O-OTHER (specify): IRP [illegible]

BASE SAMPLE NUMBER: GN 86 3455 — OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

GROUP A		✓ Hardness	00900	Residue, Settleable	50086	GROUP T	
Ammonia	00610	✓ Iron	01045	Residue, Volatile	00505	Bromoform	32104
Chemical Oxygen Demand	00340	Lead	01051	Silica	00955	Bromodichloromethane	32101
Kjeldahl Nitrogen	00625	✓ Magnesium	00927	Specific Conductance	00095	Carbon Tetrachloride	32102
Nitrate	00620	✓ Manganese	01055	Sulfate	00945	Chloroform	32106
Nitrite	00615	✓ Mercury	71900	Sulfite	00740	Chloromethane	34418
Oil & Grease	00560	Nickel	01067	Surfactants -MBAS	38260	Dibromochloromethane	32105
Organic Carbon	00680	✓ Potassium	00937	Turbidity	00076	Methylene Chloride	34423
Orthophosphate	00671	✓ Selenium	01147			Tetrachloroethylene	34475
Phosphorus, Total	00665	✓ Silver	01077			1,1,1-Trichloroethane	34506
		✓ Sodium	00929	GROUP H		Trichloroethylene	39180
GROUP D		Thallium	01059	BHC Isomers	39340	Trihalomethanes	[illegible]
✓ Cyanide, Total	00720	Zinc	01092	Chlordane	39350	PCBs	39516
Cyanide, Free	00722			DDT Isomers	39370	X VOC ORG 601/8020	
				Dieldrin	39380	X AN-MS-SD 434	
GROUP E		GROUP G		Endrin	39390		
Phenols	32730	Acidity, Total	70508	Heptachlor	39410		
		✓ Alkalinity, Total	00410	Heptachlor Epoxide	39420		
GROUP F		Alkalinity, Bicarbonate	00425	Lindane	39782		
Antimony	01097	Bromide	71870	Methoxychlor	39480		
✓ Arsenic	01002	Carbon Dioxide	00405	Toxaphene	39400		
✓ Barium	01007	Chloride	00940	2,4-D	39730	ON SITE ANALYSES	
Beryllium	01012	Color	00080	2,4,5-TP-Silvex	39760	Parameter	Value
Boron	01022	Fluoride	00951	2,4,5-T	39740	Flow 50050	mgd
✓ Cadmium	01027	Iodide	71865			Chlorine, Total 50060	mg/l
✓ Calcium	00916	Odor	00086			Dissolved Oxygen 00300	mg/l
✓ Chromium, Total	01034	✓ Residue, Total	00500			pH 00400	units
Chromium VI	01032	✓ Residue, Filterable (TDS)	70300	GROUP J		Temperature 00010	°C
✓ Copper	01042	Residue, Nonfilterable	00530	Sulfides	00745		

COMMENTS: AV#633

AF FORM 2752 JAN 81

ENVIRONMENTAL SAMPLING DATA

OEHL USE ONLY

Use this space for mechanical imprint

SAMPLING SITE IDENTIFIER (AFR 19-7)	0127
BASE WHERE SAMPLE COLLECTED	[illegible]
SAMPLING SITE DESCRIPTION	[illegible]
DATE COLLECTION BEGAN (YYMMDD)	831131
TIME COLLECTION BEGAN (24 hour clock)	[illegible]
COLLECTION METHOD	✓ GRAB / COMPOSITE ______ HOURS

MAIL REPORTS TO (circle if changed): ORIGINAL / COPY 1 / COPY 2 — USAF OEHL/SA Brooks AFB TX

SAMPLE COLLECTED BY (Name, Grade, AFSC): [illegible]

SIGNATURE: [illegible]

AUTOVON:

REASON FOR SUBMISSION: B — A-ACCIDENT/INCIDENT; R-ROUTINE/PERIODIC; C-COMPLAINT; N-NPDES; F-FOLLOWUP/CLEANUP; O-OTHER (specify)

BASE SAMPLE NUMBER: [illegible] — OEHL PIS

ANALYSES REQUESTED (check appropriate blocks)

GROUP A		Hardness	00900	Residue, Settleable	50086	GROUP T	
Ammonia	00610	Iron	01045	Residue, Volatile	00505	Bromoform	32104
Chemical Oxygen Demand	00340	Lead	01051	Silica	00955	Bromodichloromethane	32101
Kjeldahl Nitrogen	00625	Magnesium	00927	Specific Conductance	00095	Carbon Tetrachloride	32102
Nitrate	00620	Manganese	01055	Sulfate	00945	Chloroform	32106
Nitrite	00615	Mercury	71900	Sulfite	00740	Chloromethane	34418
Oil & Grease	00560	Nickel	01067	Surfactants -MBAS	38260	Dibromochloromethane	32105
Organic Carbon	00680	Potassium	00937	Turbidity	00076	Methylene Chloride	34423
Orthophosphate	00671	Selenium	01147			Tetrachloroethylene	[illegible]
Phosphorus, Total	00665	Silver	01077			1,1,1-Trichloroethane	34506
		Sodium	00929	GROUP H		Trichloroethylene	39180
GROUP D		Thallium	01059	BHC Isomers	39340	Trihalomethanes	82080
✓ Cyanide, Total	00720	Zinc	01092	Chlordane	39350	PCBs	39516
Cyanide, Free	00722			DDT Isomers	39370	[illegible]	
				Dieldrin	39380		
GROUP E		GROUP G		Endrin	39390		
Phenols	32730	Acidity, Total	70508	Heptachlor	39410		
		✓ Alkalinity, Total	00410	Heptachlor Epoxide	39420		
GROUP F		✓ Alkalinity, Bicarbonate	00425	Lindane	39782		
Antimony	01097	Bromide	71870	Methoxychlor	39480		
Arsenic	01002	Carbon Dioxide	00405	Toxaphene	39400		
Barium	01007	Chloride	00940	2,4-D	39730	ON SITE ANALYSES	
Beryllium	01012	Color	00080	2,4,5-TP-Silvex	39760	Parameter	Value
Boron	01022	Fluoride	00951	2,4,5-T	39740	Flow 50050	mgd
Cadmium	01027	Iodide	71865			Chlorine, Total 50060	mg/l
Calcium	00916	Odor	00086			Dissolved Oxygen 00300	mg/l
Chromium, Total	01034	Residue, Total	00500			pH 00400	units
Chromium VI	01032	✓ Residue, Filterable (TDS)	70300	GROUP J		Temperature 00010	°C
Copper	01042	Residue, Nonfilterable	00530	Sulfides	00745		

COMMENTS: AV# 796

AF FORM JAN 81 2752

ENVIRONMENTAL SAMPLING DATA

OEHL USE ONLY

Use this space for mechanical imprint

SAMPLING SITE IDENTIFIER AFR 19-7: 0127

BASE WHERE SAMPLE COLLECTED: MA7+R

SAMPLING SITE DESCRIPTION

DATE COLLECTION BEGAN (YYMMDD): 1861141

TIME COLLECTION BEGAN (24 hour clock): 0915

COLLECTION METHOD: GRAB / COMPOSITE ______ HOURS

MAIL REPORTS TO (circle if changed): ORIGINAL / COPY 1 / COPY 2 — USAF OEHL/SA, Brooks AFB, TX

SAMPLE COLLECTED BY (Name, Grade, AFSC)

SIGNATURE

AUTOVON

REASON FOR SUBMISSION: A-ACCIDENT/INCIDENT, R-ROUTINE/PERIODIC, C-COMPLAINT, N-NPDES, F-FOLLOWUP/CLEANUP, O-OTHER (specify)

BASE SAMPLE NUMBER: EN 86 0401

OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

GROUP A						GROUP T	
Ammonia	00610	Hardness	00900	Residue, Settleable	50086	Bromoform	32104
Chemical Oxygen Demand	00340	Iron	01045	Residue, Volatile	00505	Bromodichloromethane	32101
Kjeldahl Nitrogen	00625	Lead	01051	Silica	00955	Carbon Tetrachloride	32102
Nitrate	00620	Magnesium	00927	Specific Conductance	00095	Chloroform	32106
Nitrite	00615	Manganese	01055	Sulfate	00945	Chloromethane	34418
Oil & Grease	00560	Mercury	71900	Sulfite	00740	Dibromochloromethane	32105
Organic Carbon	00680	Nickel	01067	Surfactants -MBAS	38260	Methylene Chloride	34423
Orthophosphate	00671	Potassium	00937	Turbidity	00076	Tetrachloroethylene	34475
Phosphorus, Total	00665	Selenium	01147			1,1,1-Trichloroethane	34506
		Silver	01077			Trichloroethylene	39180
GROUP D		Sodium	00929	GROUP H		Trihalomethanes	32280
Cyanide, Total	00720	Thallium	01059	BHC Isomers	39340	PCBs	39516
Cyanide, Free	00722	Zinc	01092	Chlordane	39350		
				DDT Isomers	39370		
GROUP E		GROUP G		Dieldrin	39380	X Vol Org 601/602	
Phenols	32730	Acidity, Total	70508	Endrin	39390	X	
		✓ Alkalinity, Total	00410	Heptachlor	39410		
GROUP F		✓ Alkalinity, Bicarbonate	00425	Heptachlor Epoxide	39420	X Na, Fe, Ca, Mg	
Antimony	01097	Bromide	71870	Lindane	39782	Mn, K	
Arsenic	01002	Carbon Dioxide	00405	Methoxychlor	39480	(200.7)	
Barium	01007	Chloride	00940	Toxaphene	39400		
Beryllium	01012	Color	00080	2,4-D	39730	ON SITE ANALYSES	
Boron	01022	Fluoride	00951	2,4,5-TP-Silvex	39760	Parameter	Value
Cadmium	01027	Iodide	71865	2,4,5-T	39740	Flow 50050	
Calcium	00916	Odor	00086			Chlorine, Total 50060	
Chromium, Total	01034	Residue, Total	00500			Dissolved Oxygen 00300	
Chromium VI	01032	✓ Residue, Filterable (TDS)	70300	GROUP J		pH 00400	
Copper	01042	Residue, Nonfilterable	00530	Sulfides	00745	Temperature 00010	°C

COMMENTS: AV4771

AF FORM 2752 JAN 81

ENVIRONMENTAL SAMPLING DATA

OEHL USE ONLY

SAMPLING SITE IDENTIFIER AFR 19-7

BASE WHERE SAMPLE COLLECTED: MATHER AFB

SAMPLING SITE DESCRIPTION: AC4 ... D ... 51

DATE COLLECTION BEGAN (YYMMDD)	TIME COLLECTION BEGAN (24 hour clock)	COLLECTION METHOD
[illegible] 21	[illegible]	GRAB — COMPOSITE ______ HOURS

MAIL REPORTS TO (circle if changed): ORIGINAL — [illegible]; COPY 1; COPY 2

SAMPLE COLLECTED BY (Name, Grade, AFSC): [illegible] | SIGNATURE: [illegible] | AUTOVON

REASON FOR SUBMISSION: A-ACCIDENT/INCIDENT; R-ROUTINE/PERIODIC; C-COMPLAINT; N-NPDES; F-FOLLOWUP/CLEANUP; O-OTHER (specify) — IRP QA

BASE SAMPLE NUMBER: GW 86 0091 | OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

GROUP A							GROUP T	
Ammonia	00610	Hardness	00900	Residue, Settleable	50086		Bromoform	32104
Chemical Oxygen Demand	00340	Iron	01045	Residue, Volatile	00505		Bromodichloromethane	32101
Kjeldahl Nitrogen	00625	Lead	01051	Silica	00955		Carbon Tetrachloride	32102
Nitrate	00620	Magnesium	00927	Specific Conductance	00095		Chloroform	32106
Nitrite	00615	Manganese	01055	Sulfate	00945		Chloromethane	34418
Oil & Grease	00560	Mercury	71900	Sulfite	00740		Dibromochloromethane	32105
Organic Carbon	00680	Nickel	01067	Surfactants -MBAS	38260		Methylene Chloride	34423
Orthophosphate	00671	Potassium	00937	Turbidity	00076		Tetrachloroethylene	34475
Phosphorus, Total	00665	Selenium	01147				1,1,1-Trichloroethane	34506
		Silver	01077				Trichloroethylene	39180
		Sodium	00929	GROUP H			Trihalomethanes	32080
GROUP D		Thallium	01059	BHC Isomers	39340		PCBs	39516
Cyanide, Total	00720	Zinc	01092	Chlordane	39350	X	[illegible]	
Cyanide, Free	00722			DDT Isomers	39370	X	[illegible]	
				Dieldrin	39380	X	[illegible]	
GROUP E		GROUP G		Endrin	39390			
Phenols	32730	Acidity, Total	70508	Heptachlor	39410			
		X Alkalinity, Total	00410	Heptachlor Epoxide	39420			
GROUP F		X Alkalinity, Bicarbonate	00425	Lindane	39782			
Antimony	01097	Bromide	71870	Methoxychlor	39480			
Arsenic	01002	Carbon Dioxide	00405	Toxaphene	39400			
Barium	01007	Chloride	00940	2,4-D	39730			
Beryllium	01012	Color	00080	2,4,5-TP-Silvex	39760			
Boron	01022	Fluoride	00951	2,4,5-T	39740			
Cadmium	01027	Iodide	71865					
Calcium	00916	Odor	00086					
Chromium, Total	01034	Residue, Total	00500					
Chromium VI	01032	X Residue, Filterable (TDS)	70300	GROUP J				
Copper	01042	Residue, Nonfilterable	00530	Sulfides	00745			

ON SITE ANALYSES

Parameter		Value
Flow	50050	mgd
Chlorine, Total	50060	mg/l
Dissolved Oxygen	00300	mg/l
pH	00400	units
Temperature	00010	°C

COMMENTS

AV 4751

AF FORM JAN 81 2752

APPENDIX G

Laboratory Data

G. LABORATORY DATA

G. 1 Using the Laboratory Reports

This appendix contains all sample analytical data collected during the course of this project, in the form of original laboratory reports. All analysis reports were generated by the Acurex laboratory, and are arranged numerically by laboratory report number, which appears at the top right-hand corner of each page of data (see figure G-1).

The data are organized in the reports by analytical parameter, and are reported under the six-digit sample ID number (the leading three digits are always zeros). These parameter categories represent separate report sections: volatile aromatic organics, volatile halogenated organics, atomic absorbtion metals (As, Se, Hg), ICP metals and minerals (Ba, Cr, Cd, Pb, Zn, Fe, Ca, Mg, Mn, Na, K), alkalinity (carbonate, bicarbonate, hydroxide), total dissolved solids, anions (STD 429), total cyanide, total recoverable phenolics, and total petroleum hydrocarbons. Therefore, in order to research all data for a particular sample, the reader must refer to each parameter section which applies to the sample. Each ground water sample has one sample ID number, thus each parameter is reported using the same ID number.

To retrieve data from the reports, the reader must first determine the sample ID number for the well of interest. This may be accomplished by referring to Table G-1, which is a listing of all sample ID numbers and their corresponding well numbers. The results may then be found in the reports , along with the analysis dates, surrogate recoveries (where applicable), and method detection limits on the same page. Table G-1 lists the collection date and time for each sample, sorted by sample ID number,for computation of holding times. Table G-2 presents field chemistry data (pH, conductivity, temperature) for both sampling rounds,and is sorted by well number.

Most of the parameter data will include a "detection limit factor" for each sample. For water samples, this is a dilution factor for high-concentration analytes. The actual detection limit for a particular sample is determined by multiplying the method detection limit (in the last column of each page) by the detection limit factor.

In addition to sample results, the reports also include laboratory QA/QC sample results and second-column confirmation results. A sample type code appears above the sample ID number:

- LAN - Sample analysis
- MB - Method blank
- LDU - Laboratory duplicate
- LSP - Laboratory matrix spike
- MSL - Matrix spiking level
- DET - Method detection limit
- LAC - 2nd column confirmation run

For volatile organic analysis results (EPA Methods 601 and 8020), all compounds reported detected at or above the method detection limit have been confirmed (except methylene chloride). Second column results are reported at the end of both VOA sections under the sample ID number, and are separate from the original sample analysis report. For compounds which were detected in the first analysis but not confirmed, the original value is reported and flagged with a footnote ("n"). Samples for which compounds are confirmed at a different concentration are reported using the first-column result.

TABLE G-1

MATHER PHASE II, STAGE 3
GROUND WATER SAMPLE LIST

SAMPLE NUMBER	PROJECT NUMBER	DATE / TIME COLLECTED	SITE	BORING/ WELL #	STATIC WATER LVL	SAMPLE TYPE	AV REF NUMBER
000601	10416L	12/08/86 13:00	WD	DH48		G	DH48G2
000602	10416L	12/08/86 14:15	WD	DH63		G	DH63G2
000603	10416L	12/08/86 15:15	WD	DH10		G	DH10G2
000604	10416L	12/08/86 16:45	WD	DH11		G	DH11G2
000605	10416L	12/09/86 07:25	WD	DH61		G	DH61G2
000606	10416L	12/09/86 08:30	WD	DH62		G	DH62G2
000607	10416L	12/09/86 09:35	WD	DH47		G	DH47G2
000608	10416L	12/09/86 09:35	WD	DH47		GD	000607
000609	10416L	12/09/86 10:50	WD	DH60		G	DH60G2
000610	10416L	12/09/86 11:40	71	DH46		G	DH46G2
000611	10416L	12/09/86 12:40	71	DH59		G	DH59G2
000612	10416L	12/09/86 15:00	WD	DH40		G	DH40G2
000613	10416L	12/09/86 16:00	71	DH55		G	DH55G2
000614	10416L	12/09/86 17:00	71	DH08		G	DH08G2
000615	10416L	12/10/86 07:45	NE	DH65		G	DH65G2
000616	10416L	12/10/86 09:45	NE	DH76		G	DH76G2
000617	10416L	12/10/86 10:20	NE	DH75		G	DH75G2
000618	10416L	12/10/86 11:15	NE	DH64		G	DH64G2
000619	10416L	12/10/86 14:00	NE	DH73		G	DH73G2
000620	10416L	12/10/86 15:00	NE	DH66		G	DH66G2
000621	10416L	12/10/86 12:50	BP	HW04		G	HW04G1
000622	10416L	12/10/86 15:35	BP	MB01		G	MB01G1
000623	10416L	12/10/86 14:35	BP	K09		G	K09G1
000624	10416L	12/10/86 13:35	BP	HW03		G	HW03G1
000625	10416L	12/10/86 15:50	BP	MB04		G	MB04G1
000626	10416L	12/10/86 14:15	BP	HW05		G	HW05G1
000627	10416L	12/10/86 13:20	BP	HW06		G	HW06G1
000628	10416L	12/10/86 12:30	BP	HW01		G	HW01G1
000629	10416L	12/11/86 07:50	71	DH58		G	DH58G2
000630	10416L	12/11/86 07:50	71	DH58		GD	000629
000631	10416L	12/11/86 08:50	71	DH09		G	DH09G2
000632	10416L	12/11/86 09:50	71	DH42		G	DH42G2
000633	10416L	12/11/86 10:45	71	DH57		G	DH57G2
000634	10416L	12/11/86 12:45	71	DH41		G	DH41G2
000635	10416L	12/11/86 13:40	71	DH56		G	DH56G2
000636	10416L	12/11/86 14:20	71	DH97		GB	
000637	10416L	12/11/86 15:10	71	DH07		G	DH07G2
000638	10416L	12/11/86 16:05	71	DH43		G	DH43G2
000639	10416L	12/12/86 07:15	71	DH44		G	DH44G2
000640	10416L	12/12/86 09:15	71	DH45		G	DH45G2
000641	10416L	12/12/86 09:15	71	DH45		GD	000640
000642	10416L	12/12/86 10:45	NE	DH49		G	DH49G2
000643	10416L	12/12/86 12:15	ACW	DH70		G	DH70G2
000644	10416L	12/12/86 12:45	ACW	DH52		G	DH52G2
000645	10416L	12/12/86 14:30	ACW	DH53		G	DH53G2
000646	10416L	12/12/86 16:00	ACW	DH71		G	DH71G2
000647	10416L	12/12/86 15:00	BP	AC01		G	AC01G1
000648	10416L	12/12/86 15:35	BP	JT01		G	JT01G1
000649	10416L	12/13/86 07:30	ACW	DH54		G	DH54G2
000650	10416L	12/13/86 09:05	ACW	DH72		G	DH72G2

TABLE G-1 (continued)

MATHER PHASE II, STAGE 3
GROUND WATER SAMPLE LIST

SAMPLE NUMBER	PROJECT NUMBER	DATE / TIME COLLECTED	SITE	BORING/ WELL #	STATIC WATER LVL	SAMPLE TYPE	AV REF NUMBER
000651	10416L	12/13/86 10:00	ACW	DH50		G	DH50G2
000652	10416L	12/13/86 10:20	ACW	DH50		GD	000651
000653	10416L	12/13/86 11:00	ACW	DH51		G	DH51G2
000654	10416L	12/13/86 12:20	ACW	DH69		G	DH69G2
000655	10416L	12/13/86 14:25	ACW	DH68		G	DH68G2
000656	10416L	12/13/86 15:00	ACW	DH01		G	DH01G2
000657	10416L	12/13/86 15:40	ACW	DH67		G	DH67G2
000658	10416L	12/14/86 08:10	ACW	DH02		G	DH02G2
000659	10416L	12/14/86 08:10	ACW	DH02		GD	000658
000660	10416L	12/14/86 07:50	ACW	DH85		GB	
000661	10416L	12/14/86 08:55	ACW	DH03		G	DH03G2
000751	10416L	11/10/86 11:30	ACW	DH51		G	DH51G1
000752	10416L	11/10/86 15:00	ACW	DH52		G	DH52G1
000753	10416L	11/18/86 09:00	ACW	DH70		G	DH70G1
000754	10416L	11/11/86 11:00	ACW	DH53		G	DH53G1
000755	10416L	11/11/86 12:30	ACW	DH71		G	DH71G1
000756	10416L	11/11/86 15:10	ACW	DH54		G	DH54G1
000757	10416L	11/11/86 16:30	ACW	DH72		G	DH72G1
000758	10416L	11/11/86 17:30	ACW	DH03		G	DH03G1
000759	10416L	11/12/86 09:30	ACW	DH67		G	DH67G1
000760	10416L	11/12/86 12:30	ACW	DH68		G	DH68G1
000761	10416L	11/12/86 13:10	ACW	DH01		G	DH01G1
000762	10416L	11/12/86 13:10	ACW	DH01		GD	000761
000763	10416L	11/12/86 15:15	ACW	DH50		G	DH50G1
000764	10416L	11/12/86 16:45	ACW	DH02		G	DH02G1
000765	10416L	11/13/86 09:30	ACW	DH69		G	DH69G1
000766	10416L	11/13/86 11:00	WD	DH63		G	DH63G1
000767	10416L	11/13/86 12:50	WD	DH48		G	DH48G1
000768	10416L	11/13/86 14:50	WD	DH11		G	DH11G1
000769	10416L	11/13/86 16:45	WD	DH61		G	DH61G1
000770	10416L	11/13/86 16:45	WD	DH61		GD	000769
000771	10416L	11/14/86 08:15	WD	DH10		G	DH10G1
000772	10416L	11/14/86 09:15	WD			GB	
000773	10416L	11/14/86 11:00	WD	DH47		G	DH47G1
000774	10416L	11/14/86 12:30	WD	DH60		G	DH60G1
000775	10416L	11/14/86 14:10	NE	DH64		G	DH64G1
000776	10416L	11/14/86 15:40	NE	DH76		G	DH76G1
000777	10416L	11/14/86 16:45	WD	DH62		G	DH62G1
000778	10416L	11/15/86 10:35	NE	DH75		G	DH75G1
000779	10416L	11/15/86 12:00	NE	DH65		G	DH65G1
000780	10416L	11/15/86 14:20	NE	DH73		G	DH73G1
000781	10416L	11/15/86 16:15	NE	DH66		G	DH66G1
000783	10416L	11/15/86 17:45	WD	DH49		G	DH49G1
000784	10416L	11/15/86 18:40	71	DH45		G	DH45G1
000785	10416L	11/16/86 10:30	71	DH46		G	DH46G1
000786	10416L	11/16/86 11:45	71	DH59		G	DH59G1
000787	10416L	11/16/86 15:45	71	DH08		G	DH08G1
000788	10416L	11/16/86 16:10	71	DH58		G	DH58G1
000789	10416L	11/16/86 17:15	71	DH09		G	DH09G1
000790	10416L	11/17/86 11:15	71	DH43		G	DH43G1

TABLE G-1 (continued)

MATHER PHASE II, STAGE 3
GROUND WATER SAMPLE LIST

SAMPLE NUMBER	PROJECT NUMBER	DATE / TIME COLLECTED	SITE	BORING/ WELL #	STATIC WATER LVL	SAMPLE TYPE	AV REF NUMBER
000791	10416L	11/17/86 11:15	71	DH43		GD	000790
000792	10416L	11/17/86 12:45	71	DH07		G	DH07G1
000793	10416L	11/17/86 13:45	71	DH44		G	DH44G1
000794	10416L	11/17/86 15:30	71	DH55		G	DH55G1
000795	10416L	11/17/86 16:15	71	DH40		G	DH40G1
000796	10416L	11/18/86 09:30	71	DH42		G	DH42G1
000797	10416L	11/18/86 10:45	71	DH57		G	DH57G1
000798	10416L	11/18/86 11:30	71	DH41		G	DH41G1
000799	10416L	11/18/86 11:30	71	DH41		GD	000798
000800	10416L	11/18/86 12:45	71	DH56		G	DH56G1
000801	10416L	11/18/86 13:20	71			GB	

SITE CODES:
ACW - AC&W AREA
WD - WEST DITCH
71 - 7100 LANDFILL
NE - NORTHEAST PERIMETER
BP - BASE PRODUCTION WELL

SAMPLE TYPES:
G - GROUND WATER SAMPLE
GD - FIELD DUPLICATE GROUND WATER SAMPLE
GB - FIELD BLANK SAMPLE

AV REFERENCE NUMBER:
DH__G1 - FIRST ROUND MONITOR WELL SAMPLE
DH__G2 - SECOND ROUND MONITOR WELL SAMPLE
HW__G1 - HOUSING WELL SAMPLE
MB__G1 - MAIN BASE PRODUCTION WELL SAMPLE
K09G1 - K-9 PRODUCTION WELL
JT01G1 - JET TEST CELL PRODUCTION WELL
AC01G1 - AC&W PRODUCTION WELL

TABLE G-2

Aerovironment Inc.
Monrovia, California

F I E L D C A R D S
FIELD CHEMISTRY REPORT

			ROUND 1								ROUND 2							
					Initial			Stabilized					Initial			Stabilized		
Project Number	Site	Boring/ Well #	Sample Number	Av Ref Number	Ph1	Cond1	Temp1	Ph2	Cond2	Temp2	Sample Number	Av Ref Number	Ph1	Cond1	Temp1	Ph2	Cond2	Temp2
10416L	ACW	DH01	000761	DH01G1	7.91	200	19.2	7.71	220	19.4	000656	DH01G2	7.50	195	19.9	6.87	200	20.1
10416L	ACW	DH02	000764	DH02G1	N/A	N/A	N/A	N/A	N/A	N/A	000658	DH02G2	7.37	380	20.6	N/A	N/A	N/A
10416L	ACW	DH03	000758	DH03G1	9.12	200	18.5	8.63	174	18.4	000661	DH03G2	N/A	200	22			
10416L	71	DH07	000792	DH07G1	6.19	775	19.9	5.91	1000	19.8	000637	DH07G2	5.85	870	18.7	6.04	810	19.9
10416L	71	DH08	000787	DH08G1	6.85	1050	18.1	7.10	1050	17.9	000614	DH08G2	6.88	850	17.7	6.82	740	18.0
10416L	71	DH09	000789	DH09G1	6.40	128	18.5	6.70	340	18.1	000631	DH09G2	6.86	805	20.9	6.73	780	20.7
10416L	WD	DH10	000771	DH10G1	7.52	275	17.4	7.46	295	17.8	000603	DH10G2	7.15	260	18.1	7.46	250	18.1
10416L	WD	DH11	000768	DH11G1	7.05	250	17.9	7.01	290	18.1	000604	DH11G2	6.94	255	17.1	6.96	230	18.4
10416L	71	DH40	000795	DH40G1	7.8	190	18.5	6.4	175	18.9	000612	DH40G2	0.70	140	18.5	7.71	155	18.6
10416L	71	DH41	000798	DH41G1	6.80	440	18.6	6.05	280	18.8	000634	DH41G2	7.95	380	20.0	6.81	275	18.8
10416L	71	DH42	000796	DH42G1	6.20	625	18.5	6.40	475	19.1	000632	DH42G2	6.81	690	18.5	7.70	470	20.2
10416L	71	DH43	000790	DH43G1	9.60	250	19.2	6.10	175	19.6	000638	DH43G2	6.90	155	20.3	7.20	170	20.3
10416L	71	DH44	000793	DH44G1	6.02	620	19.1	5.80	610	19.1	000639	DH44G2	6.94	610	20.8	6.14	610	20.8
10416L	71	DH45	000784	DH45G1	7.34	550	18.4	N/A	N/A	N/A	000640	DH45G2	6.20	475	20.8	N/A	N/A	N/A
10416L	71	DH46	000785	DH46G1	7.2	470	18.5	7.6	470	19.1	000610	DH46G2	N/A	400	18.2	N/A	400	19.3
10416L	WD	DH47	000773	DH47G1	6.58	350	19.6	7.43	320	19.3	000607	DH47G2	8.07	260	17.8	7.99	260	18.1
10416L	WD	DH48	000767	DH48G1	9.02	350	18.6	7.75	210	19.3	000601	DH48G2	9.26	230	18.5	7.96	210	18.9
10416L	WD	DH49	000783	DH49G1	7.52	200	19.5	6.6	182	18.9	000642	DH49G2	8.10	190	19.3	7.80	160	20.8
10416L	ACW	DH50	000763	DH50G1	8.44	310	19.5	7.67	190	19.5	000651	DH50G2	8.48	245	22.4	6.98	150	22.5
10416L	ACW	DH51	000751	DH51G1	7.77	225	20.0	7.51	190	20.0	000653	DH51G2	8.79	210	19.1	7.22	190	20.1
10416L	ACW	DH52	000752	DH52G1	9.67	280	19.2	9.0	300	N/A	000644	DH52G2	9.10	220	20.6	9.00	220	21.2
10416L	ACW	DH53	000754	DH53G1	9.27	200	19.3	7.51	160	19.4	000645	DH53G2	8.38	150	19.2	7.59	150	20.3
10416L	ACW	DH54	000756	DH54G1	8.75	250	20.3	7.85	190	19.8	000649	DH54G2	8.18	160	20.8	7.16	170	20.5
10416L	71	DH55	000794	DH55G1	8.60	255	19.3	8.2	225	20.4	000613	DH55G2	10.3	150	19.7	9.74	175	20.3
10416L	71	DH56	000800	DH56G1	9.20	460	19.1	7.60	210	19.5	000635	DH56G2	8.52	240	18.5	7.85	150	19.5
10416L	71	DH57	000797	DH57G1	9.90	950	19.2	8.05	225	19.1	000633	DH57G2	9.88	300	20.0	8.75	195	21.0
10416L	71	DH58	000788	DH58G1	8.40	330	19.0	7.8	200	19.5	000629	DH58G2	9.16	200	19.7	7.84	150	20.0
10416L	71	DH59	000786	DH59G1	10.2	260	19.4	7.10	225	19.3	000611	DH59G2	N/A	160	19.9	N/A	190	19.9
10416L	WD	DH60	000774	DH60G1	N/A	330	19.1	8.26	225	19.4	000609	DH60G2	9.78	220	19.3	N/A	175	19.6
10416L	WD	DH61	000769	DH61G1	N/A	930	18.9	9.39	210	19.1	000605	DH61G2	N/A	N/A	18.1	N/A	N/A	19.5
10416L	WD	DH62	000777	DH62G1	N/A	440	18.3	N/A	N/A	N/A	000606	DH62G2	10.0	250	18.9	9.99	260	19.4
10416L	WD	DH63	000766	DH63G1	11.4	740	18.8	9.44	200	19.6	000602	DH63G2	10.6	210	19.2	9.14	200	19.4
10416L	NE	DH64	000775	DH64G1	10.0	340	19.5	7.71	164	19.4	000618	DH64G2	9.80	180	20.0	7.71	115	0.3
10416L	NE	DH65	000779	DH65G1	10.6	255	18.6	8.85	177	18.5	000615	DH65G2	N/A	140	23.3	N/A	140	21.1
10416L	NE	DH66	000781	DH66G1	10.8	340	18.5	8.85	174	19.0	000620	DH66G2	9.30	145	22.8	8.02	145	20.1
10416L	ACW	DH67	000759	DH67G1	8.62	375	17.6	8.64	171	19.5	000657	DH67G2	7.77	180	20.3	6.73	170	20.3
10416L	ACW	DH68	000760	DH68G1	8.62	200	19.4	8.24	171	19.1	000655	DH68G2	8.36	150	20.5	7.63	150	21.0
10416L	ACW	DH69	000765	DH69G1	9.29	143	19.9	8.93	176	19.0	000654	DH69G2	8.29	150	20.0	7.92	210	21.0
10416L	ACW	DH70	000753	DH70G1	8.51	255	18.9	7.93	155	19.2	000643	DH70G2	9.05	190	19.1	7.71	160	20.8
10416L	ACW	DH71	000755	DH71G1	9.09	190	20.4	8.06	155	19.8	000646	DH71G2	6.93	140	20.4	7.33	145	
10416L	ACW	DH72	000757	DH72G1	9.39	310	20.1	8.07	180	19.6	000650	DH72G2	8.61	200	19.5	7.24	145	21.0
10416L	NE	DH73	000780	DH73G1	9.80	225	18.3	8.80	220	18.1	000619	DH73G2	6.84	160	18.7	6.89	190	19.3
10416L	NE	DH75	000778	DH75G1	7.45	260	17.6	9.0	275	19.4	000617	DH75G2	9.53	140	18.1	8.83	200	18.8
10416L	NE	DH76	000776	DH76G1	8.64	250	19.2	7.64	230	19.4	000616	DH76G2	9.25	150	18.3	7.68	200	19.3

FIGURE G-1

TYPICAL LAB REPORT

Lab Report Number

Aerovironment
8611-147
File 6[illegible]

Parameter

Sample Type Code

Sample ID Number

Table 1. Analysis Type: 601 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000771	000772	000773	000774	999999
Compound	Concentration ug/L				
Chloromethane	ND	ND	ND	ND	0.5
Bromomethane	ND	ND	ND	ND	0.5
4 Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4 Vinyl Chloride	ND	ND	ND	ND	0.5
Chloroethane	ND	ND	ND	ND	0.5
Methylene Chloride	8.8 a	9.9 a	0.7 a	8.0 a	0.5
Trichlorofluoromethane	ND	ND	ND	ND	0.5
1,1-Dichloroethene	ND	ND	1.3	ND	0.5
1,1-Dichloroethane	ND	ND	2.4	ND	0.5
trans-1,2-Dichloroethene	ND	ND	5.2 n	ND	0.5
Chloroform	ND	4.2	ND	ND	0.5
1,2-Dichloroethane	ND	ND	ND	ND	0.5
1,1,1-Trichloroethane	ND	1.0 n	ND	ND	0.5
Carbon Tetrachloride	ND	ND	ND	ND	0.5
Bromodichloromethane	ND	ND	ND	ND	0.5
1,2-Dichloropropane	ND	ND	ND	ND	0.5
trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
Trichloroethene	ND	ND	7.6	ND	0.5
1 Dibromochloromethane	ND	ND	ND	ND	0.5
1 1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
2-Chloroethylvinylether	ND	ND	ND	ND	0.5
Bromoform	ND	ND	ND	ND	0.5
2 1,1,2,2-Tetrachloroethane	ND	ND	2.5 n	ND	0.5
2 Tetrachloroethene	ND	ND	2.5	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
3 Dichlorobenzenes	ND	ND	ND	ND	0.5
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	104	110	58	76	
Analysis date:	11/19/86	11/19/86	11/18/86	11/18/86	

Compound not confirmed by 2nd column

Multiply detection limit factor by method detection limit to determine actual sample detection limit

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute n - not found in confirmation run

ACUREX Corporation

DEC 0 2 1986

Energy & Environmental Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

November 24, 1986
Acurex ID#: 8611-030
File 6021130A

Attention: Chris Lovdahl

Subject: Analysis of Eight Water Samples
for Volatile Aromatic Organics, Received 11/12/86

Eight water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures: the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

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Aerovironment
8611-030
File 6021130A

Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000751	000752	000753	000754	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	0.6 n	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	2.1	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1	1	1	1	
Surrogate Recovery %:	83	103	62	81	
Analysis date:	11/14/86	11/17/86	11/14/86	11/14/86	

ND - not detected at detection limit times factor

Aerovironment[illegible]
8611-07
File s [illegible]

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000755	000756	000757	000758	999999
Compound			Concentration ug/L		
Benzene	ND	ND	1.7 n	ND	[illegible].5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	5.0	ND	ND	ND	0.5
Toluene	42	ND	ND	ND	1.0
Total Xylenes	23	ND	ND	ND	2.0
Detection limit factor:	1	1	1	50	
Surrogate Recovery %:	96	86	76	12[illegible]	
Analysis date:	11/17/86	11/24/86	11/14/86	11/17/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	MB3	SB1	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1	1	1	1	
Surrogate Recovery %:	NS	63	68	104	
Analysis date:	11/14/86	11/17/86	11/24/86	11/14/86	

ND - not detected at detection limit times factor

NS - not spiked

DEC 02 1986

ACUREX Corporation

Energy & Environmental Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

November 25, 1986
Acurex ID#: 8611-037
File 6021137A

Attention: Chris Lovdahl

Subject: Analysis of Six Water Samples for Volatile Aromatic Organics, Received 11/13/86

Six water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

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Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000759	000760	000761	000762	999999
Compound			Concentration ug/L		
Benzene	1.2 n	1.7 n	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	5	ND	ND	2.0
Detection limit factor:	1	1	10	10	
Surrogate Recovery %:	80	74	99	103	
Analysis date:	11/14/86	11/14/86	11/17/86	11/17/86	

ND - not detected at detection limit times factor

[illegible]

Table 1. Analysis Type: 8020 Results (continued)

Sample Type:	LAN	LAN	DET
Sample ID#:	000763	000764	999999
Compound	**Concentration ug/L**		
Benzene	ND	ND	0.5
Chlorobenzene	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	0.5
Ethylbenzene	ND	ND	0.5
Toluene	ND	ND	1.0
Total Xylenes	ND	ND	2.0
Detection limit factor:	1	5	
Surrogate Recovery %:	98	107	
Analysis date:	11/17/86	11/17/86	

ND - not detected at detection limit times factor

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8611-1[illegible]
File [illegible]

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	SB1	LDU	DET
Sample ID#:	999998	999998	999998	000764	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1	1	1	1	
Surrogate Recovery %:	NS	63	99	74	
Analysis date:	11/14/86	11/17/86	11/17/86	11/18/86	

ND - not detected at detection limit times factor

NS - not spiked

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DEC - 8 1986

Energy & Environmental Division

Aerovironment
825 Myrtle Ave.
Monrovia, CA 91016

December 4, 1986
Acurex ID#: 8611-040
File 6021140A

Attention: Chris Lovdahl

Subject: Analysis of Six Water Samples
for Volatile Aromatic Organics, Received 11/14/86

Six water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

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Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000765	000766	000767	000768	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	106	87	74	112	
Analysis date:	11/17/86	11/17/86	11/18/86	11/18/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 8020 Results (continued)

Sample Type:	LAN	LAN	DET
Sample ID#:	000769	000770	999999
Compound	Concentration ug/L		
Benzene	ND	ND	0.5
Chlorobenzene	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	0.5
Ethylbenzene	ND	ND	0.5
Toluene	ND	ND	1.0
Total Xylenes	ND	ND	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	103	89	
Analysis date:	11/18/86	11/18/86	

ND - not detected at detection limit times factor

AD-A194 900 INSTALLATION RESTORATION PROGRAM PHASE 2 CONFIRMATION/QUANTIFICATION STAGE 3(U) AEROVIRONMENT INC MONROVIA CA 05 FEB 88 AV-FR-86/596 5/10

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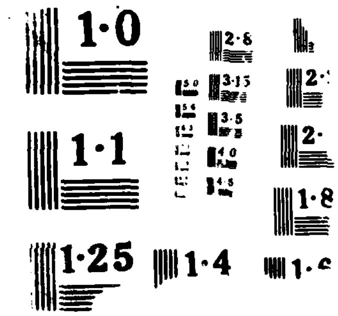
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Aerovironment
8611-040
File 6021140A

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	SB1	LDU	DET
Sample ID#:	999998	999998	999998	000766	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	106	87	74	112	
Analysis date:	11/17/86	11/17/86	11/18/86	11/18/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA
(continued)

Sample Type:	LSP	MSL	DET
Sample ID#:	000767	000767	999999
Compound	**Concentration ug/L**		
Benzene	100 %	5 s	0.5
Chlorobenzene	98 %	5 s	0.5
1,2-Dichlorobenzene	110 %	5 s	0.5
1,3-Dichlorobenzene	120 %	5 s	0.5
1,4-Dichlorobenzene	110 %	5 s	0.5
Ethylbenzene	98 %	5 s	0.5
Toluene	99 %	5 s	1.0
Total Xylenes	83 %	15 s	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	103		
Analysis date:	11/18/86	11/18/86	

ND - not detected at detection limit times factor

% - percent recovery from spiked sample

s - amount spiked in sample

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Energy & Environmental Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 4, 1986
Acurex ID#: 8611-043
File 6021143A

Attention: Chris Lovdahl

Subject: Analysis of Seven Water Samples
for Volatile Aromatic Organics, Received 11/15/86

Seven water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

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Aerovironment
8611-043
File 60211434

Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000771	000772	000773	000774	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	1.2 n	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	6.7	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	104	110	58	76	
Analysis date:	11/19/86	11/19/86	11/18/86	11/18/86	

ND - not detected at detection limit times factor

n - not found in confirmation run

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	LAN	DET
Sample ID#:	000775	000776	000777	999999
Compound		Concentration ug/L		
Benzene	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	0.5
Toluene	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	
Surrogate Recovery %:	89	79	81	
Analysis date:	11/19/86	11/19/86	11/19/86	

ND - not detected at detection limit times factor

Aerovironment
8611-043
File s021143A

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	SB1	LDU	DET
Sample ID#:	999998	999998	999998	000774	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	1.5 n	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	10	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	84	73	61	79	
Analysis date:	11/18/86	11/19/86	11/19/86	11/19/86	

ND - not detected at detection limit times factor
n - not confirmed

ACUREX Corporation

Energy & Environmental Division

DEC 1 0 1986

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 5, 1986
Acurex ID#: 8611-044
File 60211404

Attention: Chris Lovdahl

Subject: Analysis of Eleven Water Samples
for Volatile Aromatic Organics, Received 11/17/86

Eleven water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

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Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000778	000779	000780	000781	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	101	74	92	93	
Analysis date:	11/19/86	11/19/86	11/19/86	11/19/86	

ND - not detected at detection limit times factor

Aerovironment
8611-044
File 6021140A

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000783	000784	000785	000786	999999
Compound			Concentration ug/L		
Benzene	ND	ND	0.9	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	7.8	2.0	1.0
Total Xylenes	ND	ND	4.0	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	82	85	91	72	
Analysis date:	11/19/86	11/20/86	11/20/86	11/20/86	

ND - not detected at detection limit times factor

Aerovironment
8611-044
File 6021140A

Table 1. Analysis Type: 8020 Results (continued)

Sample Type:	LAN	LAN	LAN	DET
Sample ID#:	000787	000788	000789	999999
Compound	Concentration ug/L			
Benzene	1.0	ND	0.7 n	0.5
Chlorobenzene	0.7	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	0.5
Toluene	ND	5.7	8.4	1.0
Total Xylenes	ND	ND	4.0	2.0
Detection limit factor:	1.00	1.00	1.00	
Surrogate Recovery %:	71	67	74	
Analysis date:	11/21/86	11/20/86	11/20/86	

ND - not detected at detection limit times factor

Aero[illegible]
8611-144
File [illegible]

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	MB3	SB1	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound		Concentration ug/L			
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	73	51	62	52	
Analysis date:	11/19/86	11/20/86	11/21/86	11/20/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA
(continued)

Sample Type:	LDU	LSP	MSL	DET
Sample ID#:	000785	000784	000784	999999
Compound	Concentration ug/L			
Benzene	0.7	98 %	5 s	0.5
Chlorobenzene	ND	96 %	5 s	0.5
1,2-Dichlorobenzene	ND	103 %	5 s	0.5
1,3-Dichlorobenzene	ND	92 %	5 s	0.5
1,4-Dichlorobenzene	ND	103 %	5 s	0.5
Ethylbenzene	ND	94 %	5 s	0.5
Toluene	7.4	97 %	5 s	1.0
Total Xylenes	3.3	102 %	15 s	2.0
Detection limit factor:	1.00	1.00		
Surrogate Recovery %:	79	100		
Analysis date:	11/20/86	11/20/86	11/20/86	

ND - not detected at detection limit times factor

% - percent recovery from spiked sample

s - amount spiked in sample

ACUREX Corporation

DEC 1 . 1986

Energy & Environmental Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 5, 1986
Acurex ID#: 8611-047
File 6021147A

Attention: Chris Lovdahl

Subject: Analysis of Six Water Samples
for Volatile Aromatic Organics, Received 11/18/86

Six water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

Aerovironment
8611-047
File 6021147A

Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000790	000791	000792	000793	999999
Compound		Concentration ug/L			
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	2.8	2.0	ND	ND	1.0
Total Xylenes	3.0	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	85	77	101	66	
Analysis date:	11/20/86	11/21/86	11/21/86	11/21/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	DET
Sample ID#:	000794	000795	999999
Compound	Concentration ug/L		
Benzene	0.7 n	ND	0.5
Chlorobenzene	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	0.5
Ethylbenzene	ND	ND	0.5
Toluene	ND	ND	1.0
Total Xylenes	ND	ND	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	110	81	
Analysis date:	11/21/86	11/21/86	

ND - not detected at detection limit times factor

n - not found in confirmation run

Aerovironment
8611-047
File 6021147A

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	MB3	LDU	DET
Sample ID#:	999998	999998	999998	000793	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	51	62	68	107	
Analysis date:	11/20/86	11/21/86	11/24/86	11/24/86	

ND - not detected at detection limit times factor

DEC - 5 1986

ACUREX Corporation

Energy & Environmental Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 4, 1986
Acurex ID#: 8611-050
File 6021150A

Attention: Chris Lovdahl

Subject: Analysis of Six Water Samples
for Volatile Aromatic Organics, Received 11/19/86

Six water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

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Sarah Schoen, Ph.D.
Staff Chemist

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Project Chemist

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Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000796	000797	000798	000799	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	3.3	3.0	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	3.3	3.0	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	75	78	110	102	
Analysis date:	11/21/86	11/21/86	11/24/86	11/24/86	

ND - not detected at detection limit times factor

Aerovironment
8611-05
File 602115.4

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	DET
Sample ID#:	000800	000801	999999
Compound	Concentration ug/L		
Benzene	ND	ND	0.5
Chlorobenzene	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	0.5
Ethylbenzene	ND	ND	0.5
Toluene	ND	ND	1.0
Total Xylenes	ND	ND	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	77	78	
Analysis date:	11/21/86	11/22/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	SB1	LDU	DET
Sample ID#:	999998	999998	999998	000801	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	62	68	87	72	
Analysis date:	11/21/86	11/24/86	11/24/86	11/22/86	

ND - not detected at detection limit times factor

[illegible]
[illegible]
File 6[illegible]

Table 2. Analysis Type: 8020 QA
(continued)

Sample Type:	LSP	MSL	DET
Sample ID#:	000801	000801	999999
Compound	Concentration ug/L		
Benzene	100.0 %	5.0 s	0.5
Chlorobenzene	99.0 %	5.0 s	0.5
1,2-Dichlorobenzene	96.0 %	5.0 s	0.5
1,3-Dichlorobenzene	97.0 %	5.0 s	0.5
1,4-Dichlorobenzene	96.0 %	5.0 s	0.5
Ethylbenzene	89.0 %	5.0 s	0.5
Toluene	100.0 %	5.0 s	1.0
Total Xylenes	100.0 %	15.0 s	2.0
Detection limit factor:	1.00		
Surrogate Recovery %:	136		
Analysis date:	11/24/86	11/24/86	

ND - not detected at detection limit times factor

% - percent recovery from spiked sample

s - amount spiked in sample

DEC . . 1986

ACUREX Corporation

Environmental Systems Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 18, 1986
Acurex ID#: 8612-014
File 6021214A

Attention: Chris Lovdahl

Subject: Analysis of Four Water Samples
for Volatile Aromatic Organics, Received 12/9/86

Four Water Samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

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Aerovironment
8612-014
File 6021214[illegible]

Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000601	000602	000603	000604	999999
Compound			Concentration ug/L		
Benzene	ND	0.9	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	105	119	106	103	
Analysis date:	12/11/86	12/11/86	12/11/86	12/11/86	

ND - not detected at detection limit times factor

Aerovironment
8612-014
File 8612014

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	SB1	DET
Sample ID#:	999998	999998	999999
Compound	Concentration ug/L		
Benzene	ND	ND	0.5
Chlorobenzene	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	0.5
Ethylbenzene	ND	ND	0.5
Toluene	ND	ND	1.0
Total Xylenes	ND	ND	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	100	114	
Analysis date:	12/11/86	12/11/86	

ND - not detected at detection limit times factor

ACUREX Corporation

DEC ... 1986

Environmental Systems Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 22, 1986
Acurex ID#: 8612-015
File 6021215A

Attention: Chris Lovdahl

Subject: Analysis of Ten Water Samples
for Volatile Aromatic Organics, Received 12/10/86

Ten water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

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485 Clyde Avenue, PO Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex 325961 FAX (415) 964-5145

Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000605	000606	000607	000608	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	.5
Toluene	ND	ND	ND	ND	1.[illegible]
Total Xylenes	ND	ND	ND	ND	1.[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	99	93	108	119	
Analysis date:	12/11/86	12/11/86	12/11/86	12/19/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000609	000610	000611	000612	999999
Compound			Concentration ug/L		
Benzene	ND	ND	0.7 n	1.1	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	109	127	95	101	
Analysis date:	12/11/86	12/11/86	12/11/86	12/12/86	

ND - not detected at detection limit times factor

n - not found in confirmation run

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	DET
Sample ID#:	000613	000614	999999
Compound	Concentration ug/L		
Benzene	2.1 n	1.5	0.5
Chlorobenzene	ND	0.7	0.5
1,2-Dichlorobenzene	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	0.5
Ethylbenzene	ND	ND	0.5
Toluene	ND	ND	1.0
Total Xylenes	ND	ND	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	109	124	
Analysis date:	12/12/86	12/12/86	

ND - not detected at detection limit times factor

n - not found in confirmation run

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	MB3	SB1	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound		Concentration ug/L			
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	100	130	72	112	
Analysis date:	12/11/86	12/12/86	12/19/86	12/12/86	

ND - not detected at detection limit times factor

Aerovironment
8612-015
File 60212158

Table 2. Analysis Type: 8020 QA
(continued)

Sample Type:	LDU	DET
Sample ID#:	000613	999999
Compound	Concentration ug/L	
Benzene	2.0 n	0.5
Chlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
Ethylbenzene	ND	0.5
Toluene	ND	1.0
Total Xylenes	ND	2.0

Detection limit factor: 1.00

Surrogate Recovery %: 97

Analysis date: 12/12/86

ND - not detected at detection limit times factor

n - not confirmed

ACUREX Corporation

Environmental Systems Division

DEC

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 19, 1986
Acurex ID#: 8612-019
File 6021219A

Attention: Chris Lovdahl

Subject: Analysis of Fourteen Water Samples
for Volatile Aromatic Organics, Received 12/11/86

Fourteen water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

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Sarah Schoen, Ph.D.
Staff Chemist

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[illegible]
File [illegible]

Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000615	000616	000617	000618	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	ND	[illegible].5
Chlorobenzene	ND	ND	ND	ND	[illegible].5
1,2-Dichlorobenzene	ND	ND	ND	ND	[illegible].5
1,3-Dichlorobenzene	ND	ND	ND	ND	[illegible].5
1,4-Dichlorobenzene	ND	ND	ND	ND	[illegible].5
Ethylbenzene	ND	ND	ND	ND	[illegible].5
Toluene	ND	ND	ND	ND	[illegible]
Total Xylenes	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	114	96	93	112	
Analysis date:	12/12/86	12/12/86	12/12/86	12/12/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000619	000620	000621	000622	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	107	101	130	89	
Analysis date:	12/12/86	12/12/86	12/12/86	12/12/86	

ND - not detected at detection limit times factor

[illegible]
8612-119
File [illegible]

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000623	000624	000625	000626	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	108	83	78	85	
Analysis date:	12/12/86	12/12/86	12/13/86	12/13/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	DET
Sample ID#:	000627	000628	999999
Compound	Concentration ug/L		
Benzene	ND	ND	0.5
Chlorobenzene	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	0.5
Ethylbenzene	ND	ND	0.5
Toluene	ND	ND	1.0
Total Xylenes	ND	ND	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	91	147	
Analysis date:	12/13/86	12/15/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	MB3	SB1	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	[illegible].5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	[illegible].5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	[illegible].5
Toluene	ND	ND	ND	ND	1.[illegible]
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	130	130	90	114	
Analysis date:	12/12/86	12/15/86	12/17/86	12/12/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA
(continued)

Sample Type:	LDU	LDU	LSP	MSL	DET
Sample ID#:	000617	000623	000615	000615	999999
Compound			Concentration ug/L		
Benzene	ND	ND	103 %	5 s	0.5
Chlorobenzene	ND	ND	100 %	5 s	0.5
1,2-Dichlorobenzene	ND	ND	89 %	5 s	0.5
1,3-Dichlorobenzene	ND	ND	98 %	5 s	0.5
1,4-Dichlorobenzene	ND	ND	98 %	5 s	0.5
Ethylbenzene	ND	ND	102 %	5 s	0.5
Toluene	ND	ND	100 %	5 s	1.0
Total Xylenes	ND	ND	102 %	15 s	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	105	85	94	0	
Analysis date:	12/17/86	12/17/86	12/17/86	ERR	

ND - not detected at detection limit times factor

ACUREX Corporation

Environmental Systems Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 22, 1986
Acurex ID#: 8612-020
File 6021220A

Attention: Chris Lovdahl

Subject: Analysis of Ten Water Samples
for Volatile Aromatic Organics, Received 12/12/86

Ten water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures: the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

485 Clyde Avenue, PO Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex 325961 FAX (415) 964-5145

Aerovironment
8612-020
File 60012204

Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000629	000630	000631	000632	999999
Compound		Concentration ug/L			
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	1.7	1.6	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	107	82	99	94	
Analysis date:	12/15/86	12/17/86	12/22/86	12/22/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000633	000634	000635	000636	[illegible]
Compound			Concentration ug/L		
Benzene	0.8	ND	2.1 n	ND	[illegible]
Chlorobenzene	ND	ND	ND	ND	[illegible]
1,2-Dichlorobenzene	ND	ND	ND	ND	[illegible]
1,3-Dichlorobenzene	ND	ND	ND	ND	[illegible]
1,4-Dichlorobenzene	ND	ND	ND	ND	[illegible]
Ethylbenzene	ND	ND	ND	ND	[illegible]
Toluene	ND	ND	ND	ND	[illegible]
Total Xylenes	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	98	97	101	85	
Analysis date:	12/22/86	12/22/86	12/22/86	12/22/86	

ND - not detected at detection limit times factor

n - not found in confirmation run

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	DET
Sample ID#:	000637	000638	999999
Compound		Concentration ug/L	
Benzene	ND	0.7 n	0.5
Chlorobenzene	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	0.5
Ethylbenzene	ND	ND	0.5
Toluene	ND	ND	1.0
Total Xylenes	ND	ND	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	76	95	
Analysis date:	12/22/86	12/16/86	

ND - not detected at detection limit times factor

n - not found in confirmation run

Aerovironment
8612-[illegible]
File [illegible]

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	MB3	MB4	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound		Concentration ug/L			
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	130	100	99	94	
Analysis date:	12/15/86	12/17/86	12/18/86	12/22/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA
(continued)

Sample Type:	SB1	LDU	LSP	MSL	DET
Sample ID#:	999998	000630	000629	000629	999999
Compound			Concentration ug/L		
Benzene	ND	0.7	110 %	5 s	0.5
Chlorobenzene	ND	ND	98 %	5 s	0.5
1,2-Dichlorobenzene	ND	ND	87 %	5 s	0.5
1,3-Dichlorobenzene	ND	ND	94 %	5 s	0.5
1,4-Dichlorobenzene	ND	ND	88 %	5 s	0.5
Ethylbenzene	ND	ND	99 %	5 s	0.5
Toluene	ND	1.3	100 %	5 s	1.0
Total Xylenes	ND	ND	100 %	15 s	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	90	100	98		
Analysis date:	12/15/86	12/18/86	12/17/86	12/17/86	

ND - not detected at detection limit times factor

% - percent recovery from spiked sample

s - amount spiked in sample

ACUREX Corporation

Environmental Systems Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 29, 1986
Acurex ID#: 8612-022
File 6021222A

Attention: Chris Lovdahl

Subject: Analysis of Ten Water Samples
for Volatile Aromatic Organics, Received 12/13/86

Ten water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

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Aer[illegible]
8512- [illegible]
File [illegible]

Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000639	000640	000641	000642	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	ND	.5
Chlorobenzene	ND	ND	ND	ND	.5
1,2-Dichlorobenzene	ND	ND	ND	ND	.5
1,3-Dichlorobenzene	ND	ND	ND	ND	.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	96	69	70	61	
Analysis date:	12/18/86	12/18/86	12/18/86	12/18/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type: Sample ID#:	LAN 000643	LAN 000644	LAN 000645	LAN 000646	DET 999999
Compound		Concentration ug/L			
Benzene	22	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	1.6	ND	ND	ND	0.5
Ethylbenzene	1.6	ND	ND	1.0	0.5
Toluene	6.8	ND	1.3	ND	1.0
Total Xylenes	8.2	ND	ND	9.0	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	53	73	61	106	
Analysis date:	12/18/86	12/22/86	12/22/86	12/19/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	DET
Sample ID#:	000647	000648	999999
Compound	Concentration ug/L		
Benzene	ND	ND	0.5
Chlorobenzene	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	0.5
Ethylbenzene	ND	ND	0.5
Toluene	ND	ND	1.0
Total Xylenes	ND	ND	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	103	102	
Analysis date:	12/19/86	12/23/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	MB3	MB4	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound		Concentration ug/L			
Benzene	ND	ND	ND	ND	.5
Chlorobenzene	ND	ND	ND	ND	.5
1,2-Dichlorobenzene	ND	ND	ND	ND	[illegible]
1,3-Dichlorobenzene	ND	ND	ND	ND	[illegible]
1,4-Dichlorobenzene	ND	ND	ND	ND	[illegible]
Ethylbenzene	ND	ND	ND	ND	[illegible]
Toluene	ND	ND	ND	ND	[illegible]
Total Xylenes	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	99	72	94	83	
Analysis date:	12/18/86	12/19/86	12/22/86	12/23/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA
(continued)

Sample Type:	SB1	LDU	LSP	MSL	DET
Sample ID#:	999998	000648	000642	000642	999999
Compound			Concentration ug/L		
Benzene	ND	ND	96 %	5 s	.5
Chlorobenzene	ND	ND	96 %	5 s	1.5
1,2-Dichlorobenzene	ND	ND	100 %	5 s	.5
1,3-Dichlorobenzene	ND	ND	100 %	5 s	.5
1,4-Dichlorobenzene	ND	ND	98 %	5 s	.5
Ethylbenzene	ND	ND	92 %	5 s	.5
Toluene	ND	ND	94 %	5 s	1.[illegible]
Total Xylenes	ND	ND	83 %	15 s	2.[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	90	102	97		
Analysis date:	12/23/86	12/23/86	12/23/86	12/23/86	

ND - not detected at detection limit times factor

s - amount spiked in sample

% - percent recovery from spiked sample

ACUREX Corporation

Environmental Systems Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

December 29, 1986
Acurex ID#: 8612-020
File 6021223A

Attention: Chris Lovdahl

Subject: Analysis of Thirteen Water Samples
for Volatile Aromatic Organics, Received 12/15/86

Thirteen water samples were analyzed for volatile aromatic organics according to EPA Method 8020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

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[illegible]
[illegible]
File # [illegible]

Table 1. Analysis Type: 8020 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000649	000650	000651	000652	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	ND	.5
Chlorobenzene	ND	ND	ND	ND	.5
1,2-Dichlorobenzene	ND	ND	ND	ND	1.5
1,3-Dichlorobenzene	ND	ND	ND	ND	1.5
1,4-Dichlorobenzene	ND	ND	ND	ND	1.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.[illegible]
Total Xylenes	ND	ND	ND	ND	2.[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	104	101	95	83	
Analysis date:	12/19/86	12/19/86	12/19/86	12/19/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	LAN	LAN	DE[illegible]
Sample ID#:	000653	000654	000655	000656	??????
Compound	Concentration ug/L				
Benzene	ND	0.6 n	ND	ND	.[illegible]
Chlorobenzene	ND	ND	ND	ND	[illegible].5
1,2-Dichlorobenzene	ND	ND	ND	ND	[illegible].5
1,3-Dichlorobenzene	ND	ND	ND	ND	[illegible].5
1,4-Dichlorobenzene	ND	ND	ND	ND	.5
Ethylbenzene	ND	ND	ND	ND	[illegible].5
Toluene	ND	ND	7.5	ND	1.[illegible]
Total Xylenes	ND	ND	5.5	ND	2.[illegible]
Detection limit factor:	1.00	1.00	1.00	10.00	
Surrogate Recovery %:	75	63	93	65	
Analysis date:	12/19/86	12/19/86	12/23/86	12/23/86	

ND - not detected at detection limit times factor

n - not found in confirmation run

[illegible]
[illegible]
File [illegible]

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000657	000658	000659	000660	??????
Compound			Concentration ug/L		
Benzene	2.6 n	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	2.50	1.00	1.00	
Surrogate Recovery %:	104	97	96	94	
Analysis date:	12/22/86	12/23/86	12/23/86	12/23/86	

ND - not detected at detection limit times factor

n - not found in confirmation run

[illegible]
[illegible]
File [illegible]

Table 1. Analysis Type: 8020 Results
(continued)

Sample Type:	LAN	DET
Sample ID#:	000661	999999
Compound	**Concentration ug/L**	
Benzene	ND	0.5
Chlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
Ethylbenzene	ND	0.5
Toluene	ND	1.0
Total Xylenes	ND	2.0
Detection limit factor:	2.50	
Surrogate Recovery %:	88	
Analysis date:	12/23/86	

ND - not detected at detection limit times factor

Aerovironment
8612-[illegible]
File 6[illegible]

Table 2. Analysis Type: 8020 QA

Sample Type:	MB1	MB2	MB3	LDU	DET
Sample ID#:	999998	999998	999998	000659	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	ND	ND	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	84	94	83	98	
Analysis date:	12/19/86	12/22/86	12/23/86	12/23/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 8020 QA
(continued)

Sample Type:	LSP	MSL	DET
Sample ID#:	000649	000649	999999
Compound	Concentration ug/L		
Benzene	96 %	5 s	0.5
Chlorobenzene	95 %	5 s	0.5
1,2-Dichlorobenzene	96 %	5 s	0.5
1,3-Dichlorobenzene	96 %	5 s	0.5
1,4-Dichlorobenzene	94 %	5 s	0.5
Ethylbenzene	98 %	5 s	0.5
Toluene	97 %	5 s	1.0
Total Xylenes	91 %	15 s	2.0
Detection limit factor:	1.00	1.00	
Surrogate Recovery %:	102		
Analysis date:	12/23/86	12/23/86	

ND - not detected at detection limit times factor

s - amount spiked in sample

% - percent recovery from spiked sample

ACUREX Corporation

Environmental Systems Division

Aerovironment
825 Myrtle Ave.
Monrovia, Ca 91016

January 15, 1987
Acurex ID#: Mather AFB
File CON602A

Attention: Chris Lovdahl

Subject: Confirmation of Thirty-three Water Samples for Volatile Aromatic Organics, Received 11/12/86 through 12/15/86

Thirty-three water samples were confirmed for volatile aromatics according to EPA Method 3020 (Test Methods for Evaluating Solid Waste - SW846, 2nd Ed., 1982). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is complete, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a photoionization detector (PID) run in series with a Hall detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a PID alone and a column containing SP-1200 on Bentone-34.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

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Table 1. Analysis Type: 8020 Confirmations

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000754	000755	000757	000759	999999
Compound	Concentration ug/L				
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	NC	NC	NC	NC	0.5
1,2-Dichlorobenzene	NC	NC	NC	NC	0.5
1,3-Dichlorobenzene	NC	NC	NC	NC	0.5
1,4-Dichlorobenzene	NC	NC	NC	NC	0.5
Ethylbenzene	NC	3.8	NC	NC	0.5
Toluene	2.6	43	NC	NC	1.0
Total Xylenes	NC	23	NC	NC	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	93	96	132	79	
Analysis date:	11/18/86	11/18/86	11/18/86	11/18/86	

ND - not detected at detection limit times factor

NC - not being confirmed

Table 1. Analysis Type: 8020 Confirmations
(continued)

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000760	000774	000785	000786	999999
Compound	Concentration ug/L				
Benzene	ND	ND	0.7	NC	0.5
Chlorobenzene	NC	NC	NC	NC	0.5
1,2-Dichlorobenzene	NC	NC	NC	NC	0.5
1,3-Dichlorobenzene	NC	NC	NC	NC	0.5
1,4-Dichlorobenzene	NC	NC	NC	NC	0.5
Ethylbenzene	NC	NC	NC	NC	0.5
Toluene	NC	13	12	2.0	1.0
Total Xylenes	24	NC	3.0	NC	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	79	118	88	78	
Analysis date:	11/18/86	11/21/86	11/21/86	11/21/86	

ND - not detected at detection limit times factor

NC - not being confirmed

Table 1. Analysis Type: 8020 Confirmations
(continued)

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000787	000788	000789	000790	999999
Compound			Concentration ug/L		
Benzene	0.8	NC	ND	NC	0.5
Chlorobenzene	0.7	NC	NC	NC	0.5
1,2-Dichlorobenzene	NC	NC	NC	NC	0.5
1,3-Dichlorobenzene	NC	NC	NC	NC	0.5
1,4-Dichlorobenzene	NC	NC	NC	NC	0.5
Ethylbenzene	NC	NC	NC	NC	0.5
Toluene	NC	7.4	9.0	4.0	1.0
Total Xylenes	NC	NC	3.0	4.0	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	78	95	76	79	
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

ND - not detected at detection limit times factor

NC - not being confirmed

Table 1. Analysis Type: 8020 Confirmations
(continued)

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000791	000794	000798	000799	999999
Compound			Concentration ug/L		
Benzene	NC	ND	NC	NC	0.5
Chlorobenzene	NC	NC	NC	NC	0.5
1,2-Dichlorobenzene	NC	NC	1.5	1.7	0.5
1,3-Dichlorobenzene	NC	NC	NC	NC	0.5
1,4-Dichlorobenzene	NC	NC	3.1	1.6	0.5
Ethylbenzene	NC	NC	NC	NC	0.5
Toluene	3.5	NC	NC	NC	1.0
Total Xylenes	NC	NC	NC	NC	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	62	50	82	80	
Analysis date:	11/21/86	11/21/86	11/26/86	11/26/86	

ND - not detected at detection limit times factor

NC - not being confirmed

Table 1. Analysis Type: 8020 Confirmations
(continued)

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000602	000611	000612	000613	999999
Compound	Concentration ug/L				
Benzene	1.1	ND	1.4	ND	0.5
Chlorobenzene	NC	NC	NC	NC	0.5
1,2-Dichlorobenzene	NC	NC	NC	NC	0.5
1,3-Dichlorobenzene	NC	NC	NC	NC	0.5
1,4-Dichlorobenzene	NC	NC	NC	NC	0.5
Ethylbenzene	NC	NC	NC	NC	0.5
Toluene	NC	NC	NC	NC	1.0
Total Xylenes	NC	NC	NC	NC	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	115	95	101	99	
Analysis date:	12/12/86	12/12/86	12/12/86	12/12/86	

ND - not detected at detection limit times factor

NC - not being confirmed

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Table 1. Analysis Type: 8020 Confirmations
(continued)

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000614	000629	000630	000631	999999
Compound	Concentration ug/L				
Benzene	1.0	NC	NC	1.1	0.5
Chlorobenzene	1.9	NC	NC	NC	0.5
1,2-Dichlorobenzene	NC	NC	NC	NC	0.5
1,3-Dichlorobenzene	NC	NC	NC	NC	0.5
1,4-Dichlorobenzene	NC	NC	NC	NC	0.5
Ethylbenzene	NC	NC	NC	NC	0.5
Toluene	NC	2.6	1.4	NC	1.0
Total Xylenes	NC	NC	NC	NC	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	91	98	54	98	
Analysis date:	12/12/86	12/17/86	12/17/86	12/17/86	

ND - not detected at detection limit times factor

NC - not being confirmed

Table 1. Analysis Type: 8020 Confirmations
(continued)

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000633	000635	000638	000643	999999
Compound			Concentration ug/L		
Benzene	0.7	ND	ND	15	0.5
Chlorobenzene	NC	NC	NC	NC	0.5
1,2-Dichlorobenzene	NC	NC	NC	NC	0.5
1,3-Dichlorobenzene	NC	NC	NC	NC	0.5
1,4-Dichlorobenzene	NC	NC	NC	0.9	0.5
Ethylbenzene	NC	NC	NC	2.8	0.5
Toluene	NC	NC	NC	13	1.0
Total Xylenes	NC	NC	NC	10	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	104	84	94	99	
Analysis date:	12/17/86	12/22/86	12/17/86	12/19/86	

ND - not detected at detection limit times factor

NC - not being confirmed

Table 1. Analysis Type: 8020 Confirmations (continued)

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000645	000646	000654	000655	999999
Compound	Concentration ug/L				
Benzene	NC	NC	ND	NC	0.5
Chlorobenzene	NC	NC	NC	NC	0.5
1,2-Dichlorobenzene	NC	NC	NC	NC	0.5
1,3-Dichlorobenzene	NC	NC	NC	NC	0.5
1,4-Dichlorobenzene	NC	NC	NC	NC	0.5
Ethylbenzene	NC	1.5	NC	NC	0.5
Toluene	1.4	NC	NC	10	1.0
Total Xylenes	NC	10	NC	7.0	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	87	91	94	97	
Analysis date:	12/23/86	12/19/86	12/22/86	12/23/86	

ND - not detected at detection limit times factor

NC - not being confirmed

Table 1. Analysis Type: 8020 Confirmations
(continued)

Sample Type:	LAC	DET
Sample ID#:	000657	999999
Compound	Concentration ug/L	
Benzene	ND	0.5
Chlorobenzene	NC	0.5
1,2-Dichlorobenzene	NC	0.5
1,3-Dichlorobenzene	NC	0.5
1,4-Dichlorobenzene	NC	0.5
Ethylbenzene	NC	0.5
Toluene	NC	1.0
Total Xylenes	NC	2.0

Detection limit factor: 1.00

Surrogate Recovery %: 82

Analysis date: 12/22/86

ND - not detected at detection limit times factor

NC - not being confirmed

Table 2. Analysis Type: 8020 Confirmations QA

Sample Type:	MB1	MB2	MB3	MB4	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound			Concentration ug/L		
Benzene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5
Ethylbenzene	1.0	ND	0.8	0.6	0.5
Toluene	ND	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	123	116	82	92	
Analysis date:	11/18/86	11/21/86	11/26/86	12/12/86	

ND - not detected at detection limit times factor

NC - not being confirmed

Table 2. Analysis Type: 8020 Confirmations QA
(continued)

Sample Type:	MB5	MB6	MB7	DET
Sample ID#:	999998	999998	999998	999999
Compound	**Concentration ug/L**			
Benzene	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	0.5
1,2-Dichlorobenzene	ND	ND	ND	0.5
1,3-Dichlorobenzene	ND	ND	ND	0.5
1,4-Dichlorobenzene	ND	ND	ND	0.5
Ethylbenzene	1.2	2.0	ND	0.5
Toluene	ND	ND	ND	1.0
Total Xylenes	ND	ND	ND	2.0
Detection limit factor:	1.00	1.00	1.00	
Surrogate Recovery %:	94	85	85	
Analysis date:	12/17/86	12/22/86	12/23/86	

ND - not detected at detection limit times factor

NC - not being confirmed

ACUREX Corporation

DEC 0 [illegible]

Energy & Environmental Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

November 24, 1986
Acurex ID#: 8611-030
File 6011132A

Attention: Chris Lovdahl

Subject: Analysis of Eight Water Samples
for Volatile Halogenated Organics, Received 11/12/86

Eight water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

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AeroVironment
8611-030
File 8611130A

Table 1. Analysis Type: 601 Results

	Compound	LAN	LAN	LAN	LAN	DET
	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000751	000752	000753	000754	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	1.1 a	1.0 a	1.1 a	1.6 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	0.6 n	4.1	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5
	Detection limit factor:	1	1	1	1	
	Surrogate Recovery %:	83	103	62	81	
	Analysis date:	11/14/86	11/17/86	11/14/86	11/14/86	

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 1. Analysis Type: 601 Results
(continued)

	Compound	LAN 000755	LAN 000756	LAN 000757	LAN 000758	DET 999999
	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000755	000756	000757	000758	999999
		Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	ND	ND	1.6 a	110 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	90	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1	1	1	50
Surrogate Recovery %:	96	86	76	123
Analysis date:	11/17/86	11/24/86	11/14/86	11/17/86

1 - these compounds coelute
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels

Table 2. Analysis Type: 601 QA

Sample Type:	MB1	MB2	MB3	SB1	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound	Concentration ug/L				
Chloromethane	ND	ND	ND	ND	0.5
Bromomethane	ND	ND	ND	ND	0.5
4 Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4 Vinyl Chloride	ND	ND	ND	ND	0.5
Chloroethane	ND	ND	ND	ND	0.5
Methylene Chloride	1.5 a	1.5 a	0.9 a	1.4 a	0.5
Trichlorofluoromethane	ND	ND	ND	ND	0.5
1,1-Dichloroethene	ND	ND	ND	ND	0.5
1,1-Dichloroethane	ND	ND	ND	ND	0.5
trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
Chloroform	ND	ND	ND	ND	0.5
1,2-Dichloroethane	ND	ND	ND	ND	0.5
1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
Carbon Tetrachloride	ND	ND	ND	ND	0.5
Bromodichloromethane	ND	ND	ND	ND	0.5
1,2-Dichloropropane	ND	ND	ND	ND	0.5
trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
Trichloroethene	ND	ND	ND	ND	0.5
1 Dibromochloromethane	ND	ND	ND	ND	0.5
1 1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
2-Chloroethylvinylether	ND	ND	ND	ND	0.5
Bromoform	ND	ND	ND	ND	0.5
2 1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2 Tetrachloroethene	ND	ND	ND	ND	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
3 Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1	1	1	1
Surrogate Recovery %:	NS	63	68	104
Analysis date:	11/14/86	11/17/86	11/24/86	11/14/86

1 - these compounds coelute
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NS - not spiked

DEC [illegible]

ACUREX Corporation

Energy & Environmental Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

November 24, 1986
Acurex ID#: 8611-037
File 6011137A

Attention: Chris Lovdahl

Subject: Analysis of Six Water Samples
for Volatile Halogenated Organics, Received 11/13/86

Six water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

Table 1. Analysis Type: 601 Results

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000759	000760	000761	000762	999999
	Compound			Concentration ug/L		
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	1.4 a	1.4 a	20 a	17 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	770	700	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1	1	10	10
Surrogate Recovery %:	80	74	99	103
Analysis date:	11/14/86	11/14/86	11/17/86	11/17/86

1 - these compounds coelute
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels

Table 1. Analysis Type: 601 Results
(continued)

	Sample Type:	LAN	LAN	DET
	Sample ID#:	000763	000764	999999
	Compound	Concentration ug/L		
	Chloromethane	ND	ND	0.5
	Bromomethane	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	0.5
4	Vinyl Chloride	ND	ND	0.5
	Chloroethane	ND	ND	0.5
	Methylene Chloride	0.7 a	10 a	0.5
	Trichlorofluoromethane	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	0.5
	Chloroform	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	0.5
	Bromodichloromethane	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	0.5
	Trichloroethene	ND	23	0.5
1	Dibromochloromethane	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	0.5
	Bromoform	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	0.5
2	Tetrachloroethene	ND	ND	0.5
	Chlorobenzene	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	0.5

Detection limit factor:	1	5
Surrogate Recovery %:	90	107
Analysis date:	11/17/86	11/17/86

1 - these compounds coelute
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels

Table 2. Analysis Type: 601 QA

	Sample Type:	MB1	MB2	SB1	LDU	DET
	Sample ID#:	999998	999998	999998	000764	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	1.5 a	1.5 a	1.2 a	1.2 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	18	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5
	Detection limit factor:	1	1	1	1	
	Surrogate Recovery %:	NS	63	99	74	
	Analysis date:	11/14/86	11/17/86	11/17/86	11/18/86	

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   NS - not spiked

ACUREX Corporation

DEC [illegible]

Energy & Environmental Division

AeroVironment
325 Myrtle Avenue
Monrovia, Ca 91016

December 3, 1986
Acurex ID#: 8611-040
File 6011140A

Attention: Chris Lovdahl

Subject: Analysis of Six Water Samples
for Volatile Halogenated Organics, Received 11/14/86

Six water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29[illegible]). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

Table 1. Analysis Type: 601 Results

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000765	000766	000767	000768	999999
	Compound			Concentration ug/L		
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	1.1 a	1.1 a	0.8 a	1.3 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	1.6	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	2.3 n	6.3	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	12 n	ND	ND	0.5
2	Tetrachloroethene	ND	12	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5
	Detection limit factor:	1.00	1.00	1.00	1.00	
	Surrogate Recovery %:	106	87	74	112	
	Analysis date:	11/17/86	11/17/86	11/18/86	11/18/86	

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute n - not found in confirmation run

Table 1. Analysis Type: 601 Results
(continued)

	Sample Type:	LAN	LAN	DET
	Sample ID#:	000769	000770	999999
	Compound	Concentration ug/L		
	Chloromethane	ND	ND	0.5
	Bromomethane	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	0.5
4	Vinyl Chloride	ND	ND	0.5
	Chloroethane	ND	ND	0.5
	Methylene Chloride	1.5 a	1.3 a	0.5
	Trichlorofluoromethane	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	0.5
	Chloroform	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	0.5
	1,1,1-Trichloroethane	ND	0.6 n	0.5
	Carbon Tetrachloride	ND	ND	0.5
	Bromodichloromethane	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	0.5
	Trichloroethene	ND	ND	0.5
1	Dibromochloromethane	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	0.5
	Bromoform	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	0.5
2	Tetrachloroethene	ND	ND	0.5
	Chlorobenzene	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	0.5

Detection limit factor:	1.00	1.00
Surrogate Recovery %:	103	89
Analysis date:	11/18/86	11/18/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

Aero[illegible]
8611-04[illegible]
File 60111[illegible]A

Table 2. Analysis Type: 601 QA

	Sample Type:	MB1	MB2	SB1	LDU	DET
	Sample ID#:	999998	999998	999998	000766	999999
	Compound			Concentration ug/L		
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	1.5 a	ND	ND	0.6 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	1.1	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	2.7	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	13	0.5
2	Tetrachloroethene	ND	ND	ND	13	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5
	Detection limit factor:	1.00	1.00	1.00	1.00	
	Surrogate Recovery %:	63	88	98	91	
	Analysis date:	11/17/86	11/18/86	11/18/86	11/18/86	

1 - these compounds coelute
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels

Table 2. Analysis Type: 601 QA
(continued)

	Compound	LSP	MSL	DET
	Sample Type:	LSP	MSL	DET
	Sample ID#:	000767	000767	999999
		Concentration ug/L		
	Chloromethane	99 %	10 s	0.5
	Bromomethane	98 %	10 s	0.5
4	Dichlorodifluoromethane	100 %	10 s	0.5
4	Vinyl Chloride	100 %	10 s	0.5
	Chloroethane	93 %	10 s	0.5
	Methylene Chloride	70 %	5 s	0.5
	Trichlorofluoromethane	100 %	10 s	0.5
	1,1-Dichloroethene	110 %	5 s	0.5
	1,1-Dichloroethane	100 %	5 s	0.5
	trans-1,2-Dichloroethene	96 %	5 s	0.5
	Chloroform	110 %	5 s	0.5
	1,2-Dichloroethane	57 %	5 s	0.5
	1,1,1-Trichloroethane	100 %	5 s	0.5
	Carbon Tetrachloride	110 %	5 s	0.5
	Bromodichloromethane	99 %	5 s	0.5
	1,2-Dichloropropane	100 %	5 s	0.5
	trans-1,3-Dichloropropene	100 %	5 s	0.5
	Trichloroethene	100 %	5 s	0.5
1	Dibromochloromethane	96 %	5 s	0.5
1	1,1,2-Trichloroethane	96 %	5 s	0.5
1	cis-1,3-Dichloropropene	96 %	5 s	0.5
	2-Chloroethylvinylether	130 %	5 s	0.5
	Bromoform	92 %	5 s	0.5
2	1,1,2,2-Tetrachloroethane	120 %	5 s	0.5
2	Tetrachloroethene	120 %	5 s	0.5
	Chlorobenzene	110 %	5 s	0.5
3	Dichlorobenzenes	110 %	15 s	0.5

Detection limit factor: 1.00

Surrogate Recovery %: 103

Analysis date: 11/18/86 11/18/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   s - amount spiked in sample
% - percent recovery from spiked sample

ACUREX Corporation

DEC [illegible]

Energy & Environmental Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

December 4, 1986
Acurex ID#: 8611-043
File 6011143A

Attention: Chris Lovdahl

Subject: Analysis of Seven Water Samples
for Volatile Halogenated Organics, Received 11/15/86

Seven water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

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AeroVironment
8611-043
File 6011143A

Table 1. Analysis Type: 601 Results

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000771	000772	000773	000774	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	8.8 a	9.9 a	0.7 a	8.0 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	1.3	ND	0.5
	1,1-Dichloroethane	ND	ND	2.4	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	5.2 n	ND	0.5
	Chloroform	ND	4.2	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	1.0 n	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	7.6	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	2.5 n	ND	0.5
2	Tetrachloroethene	ND	ND	2.5	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5
	Detection limit factor:	1.00	1.00	1.00	1.00	
	Surrogate Recovery %:	104	110	58	76	
	Analysis date:	11/19/86	11/19/86	11/18/86	11/18/86	

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

Table 1. Analysis Type: 601 Results
(continued)

	Compound	LAN	LAN	LAN	DET
	Sample Type:	LAN	LAN	LAN	DET
	Sample ID#:	000775	000776	000777	999999
		Concentration ug/L			
	Chloromethane	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	0.5
	Methylene Chloride	7.2 a	6.6 a	6.8 a	0.5
	Trichlorofluoromethane	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	0.5
	1,1,1-Trichloroethane	0.6 n	3.3 q	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00
Surrogate Recovery %:	89	79	81
Analysis date:	11/19/86	11/19/86	11/19/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute   q - confirmation not run
4 - these compounds coelute   n - not found in confirmation run

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3611-047
File 60111474

Table 2. Analysis Type: 601 QA

	Sample Type:	MB1	MB2	SB1	LDU	DET
	Sample ID#:	999998	999998	999998	000774	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	1.5 a	0.6 a	ND	7.4 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5
	Detection limit factor:	1.00	1.00	1.00	1.00	
	Surrogate Recovery %:	84	73	61	79	
	Analysis date:	11/18/86	11/19/86	11/19/86	11/19/86	

1 - these compounds coelute
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels

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Energy & Environmental Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

December 4, 1986
Acurex ID#: 8611-044
File 6011144A

Attention: Chris Lovdahl

Subject: Analysis of Eleven Water Samples
for Volatile Halogenated Organics, Received 11/17/86

Eleven water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

AeroVironment
8611-044
File 6011144A

Table 1. Analysis Type: 601 Results

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000778	000779	000780	000781	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	7.5 a	5.2 a	7.4 a	8.0 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	0.7 n	ND	0.9 n	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	101	74	92	93
Analysis date:	11/19/86	11/19/86	11/19/86	11/19/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

Table 1. Analysis Type: 601 Results
(continued)

	Compound	LAN 000783	LAN 000784	LAN 000785	LAN 000786	DET 999999
		Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	15.0 a	18.0 a	2.3 a	ND	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

	LAN 000783	LAN 000784	LAN 000785	LAN 000786
Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	82	85	91	72
Analysis date:	11/19/86	11/20/86	11/20/86	11/20/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 1. Analysis Type: 601 Results
(continued)

	Compound	LAN 000787	LAN 000788	LAN 000789	DET 999999
		Concentration ug/L			
	Chloromethane	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	0.5
4	Dichlorodifluoromethane	0.7 n	ND	ND	0.5
4	Vinyl Chloride	0.7	ND	ND	0.5
	Chloroethane	ND	ND	ND	0.5
	Methylene Chloride	ND	ND	1.6 a	0.5
	Trichlorofluoromethane	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	1.0	0.5
	Carbon Tetrachloride	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	0.5
	Trichloroethene	2.6	ND	0.9	0.5
1	Dibromochloromethane	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	1.0 n	ND	ND	0.5
2	Tetrachloroethene	1.0 n	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00
Surrogate Recovery %:	71	67	74
Analysis date:	11/21/86	11/20/86	11/20/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

Table 2. Analysis Type: 601 QA

	Sample Type:	MB1	MB2	MB3	SB1	DET
	Sample ID#:	999998	999998	999998	999998	999999
	Compound			Concentration ug/L		
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	0.6 a	0.7 a	ND	ND	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

	MB1	MB2	MB3	SB1
Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	73	51	62	52
Analysis date:	11/19/86	11/20/86	11/21/86	11/20/86

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 2. Analysis Type: 601 QA
(continued)

	Compound	LDU	LSP	MSL	DET
	Sample Type:	LDU	LSP	MSL	DET
	Sample ID#:	000785	000784	000784	999999
		Concentration ug/L			
	Chloromethane	ND	45 %	10 s	0.5
	Bromomethane	ND	83 %	10 s	0.5
4	Dichlorodifluoromethane	ND	104 %	10 s	0.5
4	Vinyl Chloride	ND	104 %	10 s	0.5
	Chloroethane	ND	127 %	10 s	0.5
	Methylene Chloride	1.1 a	26 %	5 s	0.5
	Trichlorofluoromethane	ND	102 %	10 s	0.5
	1,1-Dichloroethene	ND	100 %	5 s	0.5
	1,1-Dichloroethane	ND	128 %	5 s	0.5
	trans-1,2-Dichloroethene	ND	93 %	5 s	0.5
	Chloroform	ND	130 %	5 s	0.5
	1,2-Dichloroethane	ND	138 %	5 s	0.5
	1,1,1-Trichloroethane	ND	95 %	5 s	0.5
	Carbon Tetrachloride	ND	90 %	5 s	0.5
	Bromodichloromethane	ND	92 %	5 s	0.5
	1,2-Dichloropropane	ND	92 %	5 s	0.5
	trans-1,3-Dichloropropene	ND	84 %	5 s	0.5
	Trichloroethene	ND	74 %	5 s	0.5
1	Dibromochloromethane	ND	83 %	5 s	0.5
1	1,1,2-Trichloroethane	ND	83 %	5 s	0.5
1	cis-1,3-Dichloropropene	ND	83 %	5 s	0.5
	2-Chloroethylvinylether	ND	ND	5 s	0.5
	Bromoform	ND	64 %	5 s	0.5
2	1,1,2,2-Tetrachloroethane	ND	66 %	5 s	0.5
2	Tetrachloroethene	ND	66 %	5 s	0.5
	Chlorobenzene	ND	65 %	5 s	0.5
3	Dichlorobenzenes	ND	31 %	15 s	0.5

Detection limit factor:	1.00	1.00
Surrogate Recovery %:	79	100
Analysis date:	11/20/86	11/20/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   s - amount spiked in smple
% - percent recovery from spiked sample

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Corporation

Energy & Environmental Division

DEC [illegible] 1986

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

December 5, 1986
Acurex ID#: 8611-047
File 6011147A

Attention: Chris Lovdahl

Subject: Analysis of Six Water Samples
for Volatile Halogenated Organics, Received 11/18/86

Six water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984: page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures: the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX (415) 964-5145

AeroVironment
8611-047
File 60111474

Table 1. Analysis Type: 601 Results

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000790	000791	000792	000793	999999
	Compound			Concentration ug/L		
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	ND	3.0 a	6.5 a	ND	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	85	77	101	66
Analysis date:	11/20/86	11/21/86	11/21/86	11/21/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Aerovironment
8611-047
File 60111474

Table 1. Analysis Type: 601 Results
(continued)

	Compound	LAN	LAN	DET
	Sample Type:	LAN	LAN	DET
	Sample ID#:	000794	000795	999999
		Concentration ug/L		
	Chloromethane	ND	ND	0.5
	Bromomethane	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	0.5
4	Vinyl Chloride	ND	ND	0.5
	Chloroethane	ND	ND	0.5
	Methylene Chloride	2.8 a	0.9 a	0.5
	Trichlorofluoromethane	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	0.5
	Chloroform	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	0.5
	Bromodichloromethane	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	0.5
	Trichloroethene	ND	ND	0.5
1	Dibromochloromethane	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	0.5
	Bromoform	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	0.5
2	Tetrachloroethene	ND	ND	0.5
	Chlorobenzene	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	0.5

Detection limit factor:	1.00	1.00
Surrogate Recovery %:	110	81
Analysis date:	11/21/86	11/21/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 2. Analysis Type: 601 QA

	Sample Type:	MB1	MB2	MB3	LDU	DET
	Sample ID#:	999998	999998	999998	000793	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	0.7 a	ND	0.9 a	0.8 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

	MB1	MB2	MB3	LDU
Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	51	62	68	107
Analysis date:	11/20/86	11/21/86	11/24/86	11/24/86

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

ACUREX Corporation

DEC ... 1986

Energy & Environmental Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

December 4, 1986
Acurex ID#: 8611-050
File 6011150A

Attention: Chris Lovdahl

Subject: Analysis of Six Water Samples
for Volatile Halogenated Organics, Received 11/19/86

Six water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

AD-A194 900 INSTALLATION RESTORATION PROGRAM PHASE 2 CONFIRMATION/QUANTIFICATION STAGE 3(U) AEROVIRONMENT INC MONROVIA CA 05 FEB 88 AV-FR-86/596 6/10

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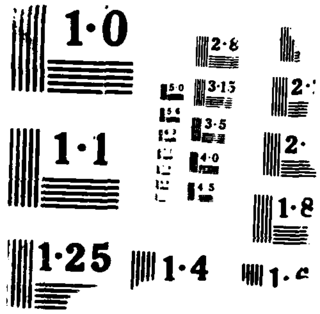
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Table 1. Analysis Type: 601 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000796	000797	000798	000799	999999
Compound	Concentration ug/L				
Chloromethane	ND	ND	ND	ND	0.5
Bromomethane	ND	ND	ND	ND	0.5
4 Dichlorodifluoromethane	ND	ND	9.9 n	9.4 n	0.5
4 Vinyl Chloride	ND	ND	9.9	9.4	0.5
Chloroethane	ND	ND	ND	ND	0.5
Methylene Chloride	1.4 a	1.2 a	ND	ND	0.5
Trichlorofluoromethane	ND	ND	ND	ND	0.5
1,1-Dichloroethene	ND	ND	ND	ND	0.5
1,1-Dichloroethane	ND	ND	0.9	0.9	0.5
trans-1,2-Dichloroethene	ND	ND	2.6 n	2.6 n	0.5
Chloroform	ND	0.6 n	ND	ND	0.5
1,2-Dichloroethane	ND	ND	2.5	2.8	0.5
1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
Carbon Tetrachloride	ND	ND	ND	ND	0.5
Bromodichloromethane	ND	ND	ND	ND	0.5
1,2-Dichloropropane	ND	ND	1.0	1.2	0.5
trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
Trichloroethene	13	ND	22	21	0.5
1 Dibromochloromethane	ND	ND	ND	ND	0.5
1 1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
2-Chloroethylvinylether	ND	ND	ND	ND	0.5
Bromoform	ND	ND	ND	ND	0.5
2 1,1,2,2-Tetrachloroethane	3.6 n	ND	2.7 n	2.6 n	0.5
2 Tetrachloroethene	3.6	ND	2.7	2.6	0.5
Chlorobenzene	ND	ND	ND	ND	0.5
3 Dichlorobenzenes	ND	ND	1.2 n	1.2 n	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	75	78	110	102
Analysis date:	11/21/86	11/21/86	11/24/86	11/24/86

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute n - not found in confirmation run

Table 1. Analysis Type: 601 Results (continued)

	Compound	LAN	LAN	DET
	Sample Type:	LAN	LAN	DET
	Sample ID#:	000800	000801	999999
		Concentration ug/L		
	Chloromethane	ND	ND	0.5
	Bromomethane	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	0.5
4	Vinyl Chloride	ND	ND	0.5
	Chloroethane	ND	ND	0.5
	Methylene Chloride	1.3 a	2.4 a	0.5
	Trichlorofluoromethane	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	0.5
	Chloroform	ND	2.5	0.5
	1,2-Dichloroethane	ND	ND	0.5
	1,1,1-Trichloroethane	ND	2.5 n	0.5
	Carbon Tetrachloride	ND	ND	0.5
	Bromodichloromethane	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	0.5
	Trichloroethene	ND	ND	0.5
1	Dibromochloromethane	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	0.5
	Bromoform	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	0.5
2	Tetrachloroethene	ND	ND	0.5
	Chlorobenzene	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	0.5
	Detection limit factor:	1.00	1.00	
	Surrogate Recovery %:	77	78	
	Analysis date:	11/21/86	11/21/86	

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute n - not found in confirmation run

AeroVironment
8611-050
File 6011153A

Table 2. Analysis Type: 601 QA

	Sample Type:	MB1	MB2	SB1	LDU	DET
	Sample ID#:	999998	999998	999998	000801	999999
	Compound			Concentration ug/L		
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	ND	0.9 a	ND	2.3 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	2.3	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5
	Detection limit factor:	1.00	1.00	1.00	1.00	
	Surrogate Recovery %:	62	68	87	72	
	Analysis date:	11/21/86	11/24/86	11/24/86	11/22/86	

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 2. Analysis Type: 601 QA
(continued)

	Sample Type:	LSP	MSL	DET
	Sample ID#:	000801	000801	999999
	Compound	Concentration ug/L		
	Chloromethane	160 %	10 s	0.5
	Bromomethane	140 %	10 s	0.5
4	Dichlorodifluoromethane	120 %	10 s	0.5
4	Vinyl Chloride	120 %	10 s	0.5
	Chloroethane	140 %	10 s	0.5
	Methylene Chloride	72 %	5 s	0.5
	Trichlorofluoromethane	120 %	5 s	0.5
	1,1-Dichloroethene	120 %	5 s	0.5
	1,1-Dichloroethane	130 %	5 s	0.5
	trans-1,2-Dichloroethene	120 %	5 s	0.5
	Chloroform	150 %	5 s	0.5
	1,2-Dichloroethane	170 %	5 s	0.5
	1,1,1-Trichloroethane	120 %	5 s	0.5
	Carbon Tetrachloride	130 %	5 s	0.5
	Bromodichloromethane	130 %	5 s	0.5
	1,2-Dichloropropane	120 %	5 s	0.5
	trans-1,3-Dichloropropene	130 %	5 s	0.5
	Trichloroethene	120 %	5 s	0.5
1	Dibromochloromethane	110 %	5 s	0.5
1	1,1,2-Trichloroethane	110 %	5 s	0.5
1	cis-1,3-Dichloropropene	110 %	5 s	0.5
	2-Chloroethylvinylether	120 %	5 s	0.5
	Bromoform	100 %	5 s	0.5
2	1,1,2,2-Tetrachloroethane	110 %	5 s	0.5
2	Tetrachloroethene	110 %	5 s	0.5
	Chlorobenzene	130 %	5 s	0.5
3	Dichlorobenzenes	100 %	15 s	0.5

Detection limit factor: 1.00

Surrogate Recovery %: 136

Analysis date: 11/24/68 11/24/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   s - amount spiked in sample
% - percent recovery from spiked sample

DEC _ _ 1986

ACUREX Corporation

Environmental Systems Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

December 18, 1986
Acurex ID#: 8612-014
File 6011214A

Attention: Chris Lovdahl

Subject: Analysis of Four Water Samples
for Volatile Halogenated Organics, Received 12/9/86

Four water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen

Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll

Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX (415) 964-5145

Table 1. Analysis Type: 601 Results

	Compound	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000601	000602	000603	000604	999999
		Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	ND	ND	ND	ND	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	1.8	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	11 n	ND	ND	0.5
2	Tetrachloroethene	ND	11	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Sample Type: LAN, LAN, LAN, LAN, DET (column headings above)

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	105	119	106	103
Analysis date:	12/11/86	12/11/86	12/11/86	12/11/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

Table 2. Analysis Type: 601 QA

	Sample Type:	MB1	SB1	DET
	Sample ID#:	999998	999998	999999
	Compound	Concentration ug/L		
	Chloromethane	ND	ND	0.5
	Bromomethane	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	0.5
4	Vinyl Chloride	ND	ND	0.5
	Chloroethane	ND	ND	0.5
	Methylene Chloride	ND	ND	0.5
	Trichlorofluoromethane	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	0.5
	Chloroform	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	0.5
	Bromodichloromethane	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	0.5
	Trichloroethene	ND	ND	0.5
1	Dibromochloromethane	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	0.5
	Bromoform	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	0.5
2	Tetrachloroethene	ND	ND	0.5
	Chlorobenzene	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	0.5

Detection limit factor:	1.00	1.00
Surrogate Recovery %:	100	114
Analysis date:	12/11/86	12/11/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

DEC [illegible] 1986

ACUREX Corporation

Environmental Systems Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

December 22, 1986
Acurex ID#: 8612-015
File 6011215A

Attention: Chris Lovdahl

Subject: Analysis of Ten Water Samples for Volatile Halogenated Organics, Received 12/10/86

Ten water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

AeroVironment
8612-015
File 6011215A

Table 1. Analysis Type: 601 Results

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000605	000606	000607	000608	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	ND	ND	ND	1.1 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	0.6 n	0.5
	1,1-Dichloroethane	ND	ND	ND	0.9	0.5
	trans-1,2-Dichloroethene	ND	ND	2.5 n	3.5 n	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	36	64	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	7.7 n	18 n	0.5
2	Tetrachloroethene	ND	ND	7.7	18	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	99	93	138	119
Analysis date:	12/11/86	12/11/86	12/19/86	12/11/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

AeroVironment
8612-115
File 6[illegible]1215A

Table 1. Analysis Type: 601 Results
(continued)

	Compound	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000609	000610	000611	000612	999999
		Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	ND	ND	ND	0.6 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	109	127	95	101
Analysis date:	12/11/86	12/11/86	12/11/86	12/12/86

1 - these compounds coelute
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels

Table 1. Analysis Type: 601 Results
(continued)

	Sample Type:	LAN	LAN	DET
	Sample ID#:	000613	000614	999999
	Compound	Concentration ug/L		
	Chloromethane	ND	ND	0.5
	Bromomethane	ND	ND	0.5
4	Dichlorodifluoromethane	ND	2.1 n	0.5
4	Vinyl Chloride	ND	2.1	0.5
	Chloroethane	ND	ND	0.5
	Methylene Chloride	ND	ND	0.5
	Trichlorofluoromethane	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	3.0 n	0.5
	Chloroform	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	0.5
	Bromodichloromethane	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	0.5
	Trichloroethene	ND	11	0.5
1	Dibromochloromethane	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	0.5
	Bromoform	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	1.4 n	0.5
2	Tetrachloroethene	ND	1.4	0.5
	Chlorobenzene	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	0.5

Detection limit factor:	1.00	1.00
Surrogate Recovery %:	109	124
Analysis date:	12/12/86	12/12/86

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute n - not found in confirmation run

Table 2.   Analysis Type: 601 QA

	Sample Type:	MB1	MB2	MB3	SB1	DET
	Sample ID#:	999998	999998	999998	999998	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	ND	2.1 a	ND	ND	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

	MB1	MB2	MB3	SB1
Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	100	130	67	112
Analysis date:	12/11/86	12/12/86	12/19/86	12/12/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 2. Analysis Type: 601 QA
(continued)

	Sample Type:	LDU	DET
	Sample ID#:	000613	999999
	Compound	Concentration ug/L	
	Chloromethane	ND	0.5
	Bromomethane	ND	0.5
4	Dichlorodifluoromethane	ND	0.5
4	Vinyl Chloride	ND	0.5
	Chloroethane	ND	0.5
	Methylene Chloride	1.9 a	0.5
	Trichlorofluoromethane	ND	0.5
	1,1-Dichloroethene	ND	0.5
	1,1-Dichloroethane	ND	0.5
	trans-1,2-Dichloroethene	ND	0.5
	Chloroform	ND	0.5
	1,2-Dichloroethane	ND	0.5
	1,1,1-Trichloroethane	ND	0.5
	Carbon Tetrachloride	ND	0.5
	Bromodichloromethane	ND	0.5
	1,2-Dichloropropane	ND	0.5
	trans-1,3-Dichloropropene	ND	0.5
	Trichloroethene	ND	0.5
1	Dibromochloromethane	ND	0.5
1	1,1,2-Trichloroethane	ND	0.5
1	cis-1,3-Dichloropropene	ND	0.5
	2-Chloroethylvinylether	ND	0.5
	Bromoform	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	0.5
2	Tetrachloroethene	ND	0.5
	Chlorobenzene	ND	0.5
3	Dichlorobenzenes	ND	0.5

Detection limit factor: 1.00

Surrogate Recovery %: 97

Analysis date: 12/12/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

ACUREX Corporation

DEC . . 1986

Environmental Systems Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

December 19, 1986
Acurex ID#: 8612-019
File 6011219A

Attention: Chris Lovdahl

Subject: Analysis of Fourteen Water Samples for Volatile Halogenated Organics, Received 12/11/86

Fourteen water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1982; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

[illegible]
[illegible]
File [illegible]

Table 1. Analysis Type: 601 Results

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000615	000616	000617	000618	[illegible]
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	[illegible]
	Bromomethane	ND	ND	ND	ND	[illegible]
4	Dichlorodifluoromethane	ND	ND	ND	ND	[illegible]
4	Vinyl Chloride	ND	ND	ND	ND	[illegible]
	Chloroethane	ND	ND	ND	ND	[illegible]
	Methylene Chloride	1.7 a	ND	0.6 a	ND	[illegible]
	Trichlorofluoromethane	ND	ND	ND	ND	[illegible]
	1,1-Dichloroethene	ND	ND	ND	ND	[illegible]
	1,1-Dichloroethane	ND	ND	ND	ND	[illegible]
	trans-1,2-Dichloroethene	ND	ND	ND	ND	[illegible]
	Chloroform	ND	ND	ND	ND	[illegible]
	1,2-Dichloroethane	ND	ND	ND	ND	[illegible]
	1,1,1-Trichloroethane	ND	ND	ND	ND	[illegible]
	Carbon Tetrachloride	ND	ND	ND	ND	[illegible]
	Bromodichloromethane	ND	ND	ND	ND	[illegible]
	1,2-Dichloropropane	ND	ND	ND	ND	[illegible]
	trans-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
	Trichloroethene	ND	ND	ND	ND	[illegible]
1	Dibromochloromethane	ND	ND	ND	ND	[illegible]
1	1,1,2-Trichloroethane	ND	ND	ND	ND	[illegible]
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
	2-Chloroethylvinylether	ND	ND	ND	ND	[illegible]
	Bromoform	ND	ND	ND	ND	[illegible]
2	1,1,2,2-Tetrachloroethane	ND	ND	0.6 n	ND	[illegible]
2	Tetrachloroethene	ND	ND	0.6	ND	[illegible]
	Chlorobenzene	ND	ND	ND	ND	[illegible]
3	Dichlorobenzenes	ND	ND	ND	ND	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	114	96	93	112
Analysis date:	12/12/86	12/12/86	12/12/86	12/12/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

Table 1. Analysis Type: 601 Results
(continued)

		Sample Type:	LAN	LAN	LAN	LAN	DET
		Sample ID#:	000619	000620	000621	000622	999999
		Compound	Concentration ug/L				
		Chloromethane	ND	ND	ND	ND	0.5
		Bromomethane	ND	ND	ND	ND	0.5
4		Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4		Vinyl Chloride	ND	ND	ND	ND	0.5
		Chloroethane	ND	ND	ND	ND	0.5
		Methylene Chloride	ND	ND	ND	ND	0.5
		Trichlorofluoromethane	ND	ND	ND	ND	0.5
		1,1-Dichloroethene	ND	ND	ND	ND	0.5
		1,1-Dichloroethane	ND	ND	ND	ND	0.5
		trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
		Chloroform	ND	ND	ND	ND	0.5
		1,2-Dichloroethane	ND	ND	ND	ND	0.5
		1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
		Carbon Tetrachloride	ND	ND	ND	ND	0.5
		Bromodichloromethane	ND	ND	ND	ND	0.5
		1,2-Dichloropropane	ND	ND	ND	ND	0.5
		trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
		Trichloroethene	ND	ND	ND	ND	0.5
1		Dibromochloromethane	ND	ND	ND	ND	0.5
1		1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1		cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
		2-Chloroethylvinylether	ND	ND	ND	ND	0.5
		Bromoform	ND	ND	ND	ND	0.5
2		1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2		Tetrachloroethene	ND	ND	ND	ND	0.5
		Chlorobenzene	ND	ND	ND	ND	0.5
3		Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	107	101	130	89	
Analysis date:	12/12/86	12/12/86	12/12/86	12/12/86	

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 1. Analysis Type: 601 Results
(continued)

	Compound	LAN 000623	LAN 000624	LAN 000625	LAN 000626	DET 999999
	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000623	000624	000625	000626	999999
		Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	ND	ND	ND	ND	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	0.7	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	108	83	78	85
Analysis date:	12/12/86	12/12/86	12/13/86	12/13/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 1. Analysis Type: 601 Results
(continued)

	Compound	LAN	LAN	DET
	Sample Type:	LAN	LAN	DET
	Sample ID#:	000627	000628	999999
		Concentration ug/L		
	Chloromethane	ND	ND	0.5
	Bromomethane	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	0.5
4	Vinyl Chloride	ND	ND	0.5
	Chloroethane	ND	ND	0.5
	Methylene Chloride	ND	ND	0.5
	Trichlorofluoromethane	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	0.5
	Chloroform	ND	ND	0.5
	1,2-Dichloroethane	ND	2.8	0.5
	1,1,1-Trichloroethane	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	0.5
	Bromodichloromethane	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	0.5
	Trichloroethene	ND	ND	0.5
1	Dibromochloromethane	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	0.5
	Bromoform	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	0.5
2	Tetrachloroethene	ND	ND	0.5
	Chlorobenzene	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	0.5

Detection limit factor:	1.00	1.00
Surrogate Recovery %:	91	147
Analysis date:	12/13/86	12/15/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 2. Analysis Type: 601 QA

		MB1	MB2	MB3	SB1	DET
	Sample Type:	MB1	MB2	MB3	SB1	DET
	Sample ID#:	999998	999998	999998	999998	999998
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	2.1 a	4.1 a	1.1 a	0.7 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	ND	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

	MB1	MB2	MB3	SB1
Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	130	130	90	114
Analysis date:	12/12/86	12/15/86	12/17/86	12/12/86

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 2. Analysis Type: 601 QA
continued)

Sample Type:	LDU	LDU	LSP	MSL	DET
Sample ID#:	000617	000623	000615	000613	[illegible]
Compound	Concentration ug/L				
Chloromethane	ND	ND	74 %	10 s	[illegible]
Bromomethane	ND	ND	77 %	10 s	[illegible]
4 Dichlorodifluoromethane	ND	ND	78 %	10 s	[illegible]
4 Vinyl Chloride	ND	ND	78 %	10 s	[illegible]
Chloroethane	ND	ND	79 %	10 s	[illegible]
Methylene Chloride	ND	ND	72 %	5 s	[illegible]
Trichlorofluoromethane	ND	ND	90 %	5 s	[illegible]
1,1-Dichloroethene	ND	ND	96 %	5 s	[illegible]
1,1-Dichloroethane	ND	ND	88 %	5 s	[illegible]
trans-1,2-Dichloroethene	ND	ND	91 %	5 s	[illegible]
Chloroform	ND	ND	88 %	5 s	[illegible]
1,2-Dichloroethane	2.2	1.2	78 %	5 s	[illegible]
1,1,1-Trichloroethane	ND	ND	91 %	5 s	[illegible]
Carbon Tetrachloride	ND	ND	91 %	5 s	[illegible]
Bromodichloromethane	ND	ND	89 %	5 s	[illegible]
1,2-Dichloropropane	ND	ND	90 %	5 s	[illegible]
trans-1,3-Dichloropropene	ND	ND	89 %	5 s	[illegible]
Trichloroethene	ND	ND	92 %	5 s	[illegible]
1 Dibromochloromethane	ND	ND	90 %	5 s	[illegible]
1 1,1,2-Trichloroethane	ND	ND	90 %	5 s	[illegible]
1 cis-1,3-Dichloropropene	ND	ND	90 %	5 s	[illegible]
2-Chloroethylvinylether	ND	ND	63 %	5 s	[illegible]
Bromoform	ND	ND	82 %	5 s	[illegible]
2 1,1,2,2-Tetrachloroethane	0.9	ND	89 %	5 s	[illegible]
2 Tetrachloroethene	0.9	ND	94 %	5 s	[illegible]
Chlorobenzene	ND	ND	98 %	5 s	[illegible]
3 Dichlorobenzenes	ND	ND	95 %	15 s	[illegible]

Detection limit factor:	1.00	1.00	1.00
Surrogate Recovery %:	105	84	94
Analysis date:	12/17/86	12/17/86	12/17/86

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

ACUREX Corporation

Environmental Systems Division

Aerovironment
825 Myrtle Avenue
Monrovia, CA 91016

December [illegible], 1986
Acurex ID#: 86[illegible]
File [illegible]

Attention: Chris Lovdahl

Subject: Analysis of Ten Water Samples
For Volatile Halogenated Organics, Received 12/12/86

Ten water samples were analyzed for volatile halogenated organics according to EPA Method 601 Federal Register, volume 49 #209, October 26, 1984; page 29 . Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopack B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

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[illegible]

Table 1. Analysis Type: 601 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000629	000630	000631	000632	######
Compound			Concentration ug/L		
Chloromethane	ND	ND	ND	ND	.5
Bromomethane	ND	ND	ND	ND	.5
4 Dichlorodifluoromethane	ND	ND	ND	ND	.5
4 Vinyl Chloride	ND	ND	ND	ND	.5
Chloroethane	ND	ND	ND	ND	.5
Methylene Chloride	ND	ND	ND	ND	.5
Trichlorofluoromethane	ND	ND	ND	ND	.5
1,1-Dichloroethene	ND	ND	ND	ND	.5
1,1-Dichloroethane	ND	ND	ND	ND	.5
trans-1,2-Dichloroethene	ND	ND	ND	ND	.5
Chloroform	ND	ND	ND	ND	.5
1,2-Dichloroethane	ND	ND	ND	ND	.5
1,1,1-Trichloroethane	ND	ND	ND	ND	.5
Carbon Tetrachloride	ND	ND	ND	ND	.5
Bromodichloromethane	ND	ND	ND	ND	.5
1,2-Dichloropropane	ND	ND	ND	ND	.5
trans-1,3-Dichloropropene	ND	ND	ND	ND	.5
Trichloroethene	ND	ND	7.8	17.0	.5
1 Dibromochloromethane	ND	ND	ND	ND	.5
1 1,1,2-Trichloroethane	ND	ND	ND	ND	.5
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	.5
2-Chloroethylvinylether	ND	ND	ND	ND	.5
Bromoform	ND	ND	ND	ND	.5
2 1,1,2,2-Tetrachloroethane	ND	ND	1.0 n	2.7 -	.5
2 Tetrachloroethene	ND	ND	1.0	2.7	.5
Chlorobenzene	ND	ND	ND	ND	.5
3 Dichlorobenzenes	ND	ND	ND	ND	.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	107	82	99	94
Analysis date:	12/15/86	12/17/86	12/22/86	12/22/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

Table 1. Analysis Type: 601 Results
(continued)

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000633	000634	000635	000636	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	1.0 n	ND	ND	0.5
4	Vinyl Chloride	ND	1.0	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	ND	ND	ND	0.9 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	1.1 n	ND	ND	0.5
	Chloroform	ND	ND	0.9 n	4.8	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	0.8	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	ND	7.0	ND	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	0.6 n	ND	ND	0.5
2	Tetrachloroethene	ND	0.6	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	98	99	102	87
Analysis date:	12/22/86	12/22/86	12/22/86	12/22/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

Table 1. Analysis Type: 601 Results
(continued)

Sample Type:	LAN	LAN	DET
Sample ID#:	000637	000638	999999
Compound	Concentration ug/L		
Chloromethane	ND	ND	0.5
Bromomethane	ND	ND	0.5
4 Dichlorodifluoromethane	ND	ND	0.5
4 Vinyl Chloride	ND	ND	0.5
Chloroethane	ND	ND	0.5
Methylene Chloride	ND	ND	0.5
Trichlorofluoromethane	ND	ND	0.5
1,1-Dichloroethene	ND	ND	0.5
1,1-Dichloroethane	ND	ND	0.5
trans-1,2-Dichloroethene	ND	ND	0.5
Chloroform	ND	ND	0.5
1,2-Dichloroethane	ND	ND	0.5
1,1,1-Trichloroethane	ND	0.5 n	0.5
Carbon Tetrachloride	ND	ND	0.5
Bromodichloromethane	ND	ND	0.5
1,2-Dichloropropane	ND	ND	0.5
trans-1,3-Dichloropropene	ND	ND	0.5
Trichloroethene	ND	ND	0.5
1 Dibromochloromethane	ND	ND	0.5
1 1,1,2-Trichloroethane	ND	ND	0.5
1 cis-1,3-Dichloropropene	ND	ND	0.5
2-Chloroethylvinylether	ND	ND	0.5
Bromoform	ND	ND	0.5
2 1,1,2,2-Tetrachloroethane	ND	ND	0.5
2 Tetrachloroethene	ND	ND	0.5
Chlorobenzene	ND	ND	0.5
3 Dichlorobenzenes	ND	ND	0.5

Detection limit factor:	1.00	1.00
Surrogate Recovery %:	75	95
Analysis date:	12/22/86	12/16/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

[illegible]

Table 2. Analysis Type: 601 QA

Sample Type:	MB1	MB2	MB3	MB4	[illegible]
Sample ID#:	999998	999999	999999	999999	[illegible]
Compound		Concentration ug/L			
Chloromethane	ND	ND	ND	ND	[illegible]
Bromomethane	ND	ND	ND	ND	[illegible]
4 Dichlorodifluoromethane	ND	ND	ND	ND	[illegible]
4 Vinyl Chloride	ND	ND	ND	ND	[illegible]
Chloroethane	ND	ND	ND	ND	[illegible]
Methylene Chloride	ND	1.1 a	1.5 a	2.8 a	[illegible]
Trichlorofluoromethane	ND	ND	ND	ND	[illegible]
1,1-Dichloroethene	ND	ND	ND	ND	[illegible]
1,1-Dichloroethane	ND	ND	ND	ND	[illegible]
trans-1,2-Dichloroethene	ND	ND	ND	ND	[illegible]
Chloroform	ND	ND	ND	ND	[illegible]
1,2-Dichloroethane	ND	ND	ND	ND	[illegible]
1,1,1-Trichloroethane	ND	ND	ND	ND	[illegible]
Carbon Tetrachloride	ND	ND	ND	ND	[illegible]
Bromodichloromethane	ND	ND	ND	ND	[illegible]
1,2-Dichloropropane	ND	ND	ND	ND	[illegible]
trans-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
Trichloroethene	ND	ND	ND	ND	[illegible]
1 Dibromochloromethane	ND	ND	ND	ND	[illegible]
1 1,1,2-Trichloroethane	ND	ND	ND	ND	[illegible]
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
2-Chloroethylvinylether	ND	ND	ND	ND	[illegible]
Bromoform	ND	ND	ND	ND	[illegible]
2 1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	[illegible]
2 Tetrachloroethene	ND	ND	ND	ND	[illegible]
Chlorobenzene	ND	ND	ND	ND	[illegible]
3 Dichlorobenzenes	ND	ND	ND	ND	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	130	90	79	97
Analysis date:	12/15/86	12/17/86	12/18/86	12/22/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 2. Analysis Type: 601 QA
(continued)

Sample Type:	SBI	LCU	LSP	MSL	CET
Sample ID#:	999998	000530	000529	000529	[illegible]
Compound		Concentration ug/L			
Chloromethane	ND	ND	88 %	10 s	
Bromomethane	ND	ND	87 %	10 s	[illegible]
4 Dichlorodifluoromethane	ND	ND	87 %	10 s	[illegible]
4 Vinyl Chloride	ND	ND	88 %	10 s	[illegible]
Chloroethane	ND	ND	88 %	10 s	[illegible]
Methylene Chloride	ND	9.3 a	81 %	5 s	[illegible]
Trichlorofluoromethane	ND	ND	91 %	5 s	[illegible]
1,1-Dichloroethene	ND	ND	86 %	5 s	[illegible]
1,1-Dichloroethane	ND	ND	87 %	5 s	[illegible]
trans-1,2-Dichloroethene	ND	ND	90 %	5 s	[illegible]
Chloroform	ND	ND	95 %	5 s	[illegible]
1,2-Dichloroethane	ND	ND	111 %	5 s	[illegible]
1,1,1-Trichloroethane	ND	ND	95 %	5 s	[illegible]
Carbon Tetrachloride	ND	ND	94 %	5 s	[illegible]
Bromodichloromethane	ND	ND	91 %	5 s	[illegible]
1,2-Dichloropropane	ND	ND	94 %	5 s	[illegible]
trans-1,3-Dichloropropene	ND	ND	93 %	5 s	
Trichloroethene	ND	ND	94 %	5 s	[illegible]
1 Dibromochloromethane	ND	ND	89 %	5 s	[illegible]
1 1,1,2-Trichloroethane	ND	ND	89 %	5 s	[illegible]
1 cis-1,3-Dichloropropene	ND	ND	89 %	5 s	[illegible]
2-Chloroethylvinylether	ND	ND	75 %	5 s	[illegible]
Bromoform	ND	ND	92 %	5 s	[illegible]
2 1,1,2,2-Tetrachloroethane	ND	ND	95 %	5 s	[illegible]
2 Tetrachloroethene	ND	ND	95 %	5 s	[illegible]
Chlorobenzene	ND	ND	100 %	5 s	[illegible]
3 Dichlorobenzenes	ND	ND	95 %	15 s	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	90	97	95	[illegible]
Analysis date:	12/15/86	12/18/86	12/17/86	12/17/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute   s - amount spiked in sample
4 - these compounds coelute   % - percent recovery from spiked sample

ACUREX Corporation

Environmental Systems Division

Aerovironment
825 Myrtle Avenue
Monrovia, Ca 91016

December 29, 1986
Acurex ID#: 8612-022
File 6011222A

Attention: Chris Lovdahl

Subject: Analysis of Ten Water Samples
for Volatile Halogenated Organics, Received 12/12/86

Ten water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: ____________________
Sarah Schoen, Ph.D.
Staff Chemist

____
Greg Nycoil
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

485 Clyde Avenue, PO Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex 325961 FAX (415) 964-5145

[illegible]

Table 1. Analysis Type: 601 Results

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000639	000640	000641	000642	[illegible]
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	[illegible]
	Bromomethane	ND	ND	ND	ND	[illegible]
4	Dichlorodifluoromethane	ND	ND	ND	ND	[illegible]
4	Vinyl Chloride	ND	ND	ND	ND	[illegible]
	Chloroethane	ND	ND	ND	ND	[illegible]
	Methylene Chloride	ND	ND	ND	ND	[illegible]
	Trichlorofluoromethane	ND	ND	ND	ND	[illegible]
	1,1-Dichloroethene	ND	ND	ND	ND	[illegible]
	1,1-Dichloroethane	ND	ND	ND	ND	[illegible]
	trans-1,2-Dichloroethene	ND	ND	ND	ND	[illegible]
	Chloroform	ND	ND	ND	ND	[illegible]
	1,2-Dichloroethane	ND	ND	ND	ND	[illegible]
	1,1,1-Trichloroethane	ND	ND	ND	ND	[illegible]
	Carbon Tetrachloride	ND	ND	ND	ND	[illegible]
	Bromodichloromethane	ND	ND	ND	ND	[illegible]
	1,2-Dichloropropane	ND	ND	ND	ND	[illegible]
	trans-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
	Trichloroethene	ND	ND	ND	ND	[illegible]
1	Dibromochloromethane	ND	ND	ND	ND	[illegible]
1	1,1,2-Trichloroethane	ND	ND	ND	ND	[illegible]
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
	2-Chloroethylvinylether	ND	ND	ND	ND	[illegible]
	Bromoform	ND	ND	ND	ND	[illegible]
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	[illegible]
2	Tetrachloroethene	ND	ND	ND	ND	[illegible]
	Chlorobenzene	ND	ND	ND	ND	[illegible]
3	Dichlorobenzenes	ND	ND	ND	ND	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	110	72	67	58
Analysis date:	12/18/86	12/18/86	12/18/86	12/18/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 1. Analysis Type: 601 Results
(continued)

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000643	000644	000645	000646	[illegible]
Compound	Concentration ug/L				
Chloromethane	ND	ND	ND	ND	[illegible]
Bromomethane	ND	ND	ND	ND	[illegible]
4 Dichlorodifluoromethane	ND	ND	ND	ND	[illegible]
4 Vinyl Chloride	ND	ND	ND	ND	[illegible]
Chloroethane	ND	ND	ND	ND	[illegible]
Methylene Chloride	ND	ND	ND	ND	[illegible]
Trichlorofluoromethane	ND	ND	ND	ND	[illegible]
1,1-Dichloroethene	ND	ND	ND	ND	[illegible]
1,1-Dichloroethane	ND	ND	ND	ND	[illegible]
trans-1,2-Dichloroethene	ND	ND	ND	ND	[illegible]
Chloroform	ND	ND	ND	ND	[illegible]
1,2-Dichloroethane	ND	ND	ND	ND	[illegible]
1,1,1-Trichloroethane	ND	ND	ND	ND	[illegible]
Carbon Tetrachloride	ND	ND	ND	ND	[illegible]
Bromodichloromethane	ND	ND	ND	ND	[illegible]
1,2-Dichloropropane	ND	ND	ND	ND	[illegible]
trans-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
Trichloroethene	ND	5.7	ND	ND	[illegible]
1 Dibromochloromethane	ND	ND	ND	ND	[illegible]
1 1,1,2-Trichloroethane	ND	ND	ND	ND	[illegible]
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
2-Chloroethylvinylether	ND	ND	ND	ND	[illegible]
Bromoform	ND	ND	ND	ND	[illegible]
2 1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	[illegible]
2 Tetrachloroethene	ND	ND	ND	ND	[illegible]
Chlorobenzene	ND	ND	ND	ND	[illegible]
3 Dichlorobenzenes	ND	ND	ND	ND	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	49	73	55	102
Analysis date:	12/18/86	12/22/86	12/22/86	12/19/86

1 - these compounds coelute
2 - these compounds coelute
3 - mixture of isomers and coelute
4 - these compounds coelute

ND - not detected at detection limit times [illegible]
a - below normal laboratory background level

Table 1. Analysis Type: 601 Results
(continued)

	Compound	LAN	LAN	DET
	Sample Type:	LAN	LAN	DET
	Sample ID#:	000647	000648	999999
		Concentration ug/L		
	Chloromethane	ND	ND	0.5
	Bromomethane	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	0.5
4	Vinyl Chloride	ND	ND	0.5
	Chloroethane	ND	ND	0.5
	Methylene Chloride	ND	1.4 a	0.5
	Trichlorofluoromethane	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	0.5
	Chloroform	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	0.5
	Bromodichloromethane	ND	0.7	0.5
	1,2-Dichloropropane	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	0.5
	Trichloroethene	1.8	ND	0.5
1	Dibromochloromethane	ND	1.7	0.5
1	1,1,2-Trichloroethane	ND	1.7 n	0.5
1	cis-1,3-Dichloropropene	ND	1.7 n	0.5
	2-Chloroethylvinylether	ND	ND	0.5
	Bromoform	ND	2.0	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	0.5
2	Tetrachloroethene	ND	ND	0.5
	Chlorobenzene	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	0.5

Detection limit factor:	1.00	1.00
Surrogate Recovery %:	102	121
Analysis date:	12/19/86	12/23/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute   n - not found in confirmation run

[illegible]

Table 1. Analysis Type: 601 OA

Sample Type: Sample ID#:	MB1 999998	MB2 999999	MB3 999999	MB4 999999	DET [illegible]
Compound			Concentration ug/L		
Chloromethane	ND	ND	ND	ND	[illegible]
Bromomethane	ND	ND	ND	ND	[illegible]
4 Dichlorodifluoromethane	ND	ND	ND	ND	[illegible]
4 Vinyl Chloride	ND	ND	ND	ND	[illegible]
Chloroethane	ND	ND	ND	ND	[illegible]
Methylene Chloride	1.6 a	ND	2.8 a	ND	[illegible]
Trichlorofluoromethane	ND	ND	ND	ND	[illegible]
1,1-Dichloroethene	ND	ND	ND	ND	[illegible]
1,1-Dichloroethane	ND	ND	ND	ND	[illegible]
trans-1,2-Dichloroethene	ND	ND	ND	ND	[illegible]
Chloroform	ND	ND	ND	ND	[illegible]
1,2-Dichloroethane	ND	ND	ND	ND	[illegible]
1,1,1-Trichloroethane	ND	ND	ND	ND	[illegible]
Carbon Tetrachloride	ND	ND	ND	ND	[illegible]
Bromodichloromethane	ND	ND	ND	ND	[illegible]
1,2-Dichloropropane	ND	ND	ND	ND	[illegible]
trans-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
Trichloroethene	ND	ND	ND	ND	[illegible]
1 Dibromochloromethane	ND	ND	ND	ND	[illegible]
1 1,1,2-Trichloroethane	ND	ND	ND	ND	[illegible]
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
2-Chloroethylvinylether	ND	ND	ND	ND	[illegible]
Bromoform	ND	ND	ND	ND	[illegible]
2 1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	[illegible]
2 Tetrachloroethene	ND	ND	ND	ND	[illegible]
Chlorobenzene	ND	ND	ND	ND	[illegible]
3 Dichlorobenzenes	ND	ND	ND	ND	[illegible]

	MB1	MB2	MB3	MB4
Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	79	70	97	75
Analysis date:	12/18/86	12/19/86	12/22/86	12/23/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 2. Analysis Type: [illegible]
continued

Sample Type:	SS1	[illegible]	LSP	MSL	[illegible]
Sample ID#:	999993	[illegible]548	[illegible]542	[illegible]542	[illegible]
Compound	Concentration ug/L				
Chloromethane	ND	ND	85 %	10 s	[illegible]
Bromomethane	ND	ND	74 %	10 s	[illegible]
4 Dichlorodifluoromethane	ND	ND	[illegible] %	10 s	[illegible]
4 Vinyl Chloride	ND	ND	[illegible] %	10 s	[illegible]
Chloroethane	ND	ND	14[illegible] %	10 s	[illegible]
Methylene Chloride	1.2 a	ND	14[illegible] %	5 s	[illegible]
Trichlorofluoromethane	ND	ND	96 %	5 s	[illegible]
1,1-Dichloroethene	ND	ND	[illegible] %	5 s	[illegible]
1,1-Dichloroethane	ND	ND	[illegible] %	5 s	[illegible]
trans-1,2-Dichloroethene	ND	ND	95 %	5 s	[illegible]
Chloroform	ND	ND	96 %	5 s	[illegible]
1,2-Dichloroethane	ND	ND	[illegible] %	5 s	[illegible]
1,1,1-Trichloroethane	ND	ND	[illegible] %	5 s	[illegible]
Carbon Tetrachloride	ND	ND	97 %	5 s	[illegible]
Bromodichloromethane	ND	[illegible].5	[illegible] %	5 s	[illegible]
1,2-Dichloropropane	ND	ND	99 %	5 s	[illegible]
trans-1,3-Dichloropropene	ND	ND	[illegible] %	5 s	[illegible]
Trichloroethene	ND	ND	[illegible] %	5 s	[illegible]
1 Dibromochloromethane	ND	1.5	[illegible] %	5 s	[illegible]
1 1,1,2-Trichloroethane	ND	1.5	[illegible] %	5 s	[illegible]
1 cis-1,3-Dichloropropene	ND	1.5	[illegible] %	5 s	[illegible]
2-Chloroethylvinylether	ND	ND	[illegible] %	5 s	[illegible]
Bromoform	ND	1.5	120 %	5 s	[illegible]
2 1,1,2,2-Tetrachloroethane	ND	ND	95 %	5 s	[illegible]
2 Tetrachloroethene	ND	ND	95 %	5 s	[illegible]
Chlorobenzene	ND	ND	[illegible] %	5 s	[illegible]
3 Dichlorobenzenes	ND	ND	120 %	15 s	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	87	91	112	
Analysis date:	12/23/86	12/23/86	12/23/86	12/23/86

1 - these compounds coelute   ND - not detected at detection limit times [illegible]
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute   s - amount spiked in sample
4 - these compounds coelute   % - percent recovery from spiked sample

ACUREX Corporation

Environmental Systems Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

December 29, 1986
Acurex ID#: 8612-[illegible]
File 601122[illegible]A

Attention: Chris [illegible]

Subject: Analysis of Thirteen Water Samples
for Volatile Halogenated Organics, Received 12/15/86

Thirteen water samples were analyzed for volatile halogenated organics according to EPA Method 601 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen

Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures; the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

[illegible]

Table 1. Analysis Type: 601 Results

Sample Type:	LAN	LAN	LAN	LAN	[illegible]
Sample ID#:	000649	000650	000651	000652	[illegible]
Compound	Concentration ug/L				
Chloromethane	ND	ND	ND	ND	[illegible]
Bromomethane	ND	ND	ND	ND	[illegible]
4 Dichlorodifluoromethane	ND	ND	ND	ND	[illegible]
4 Vinyl Chloride	ND	ND	ND	ND	[illegible]
Chloroethane	ND	ND	ND	ND	[illegible]
Methylene Chloride	ND	1.0 a	1.0 a	1.0 a	[illegible]
Trichlorofluoromethane	ND	ND	ND	ND	[illegible]
1,1-Dichloroethene	ND	ND	ND	ND	[illegible]
1,1-Dichloroethane	ND	ND	ND	ND	[illegible]
trans-1,2-Dichloroethene	ND	ND	ND	ND	[illegible]
Chloroform	ND	ND	ND	ND	[illegible]
1,2-Dichloroethane	ND	ND	ND	ND	[illegible]
1,1,1-Trichloroethane	ND	ND	ND	ND	[illegible]
Carbon Tetrachloride	ND	ND	ND	ND	[illegible]
Bromodichloromethane	ND	ND	ND	ND	[illegible]
1,2-Dichloropropane	ND	ND	ND	ND	[illegible]
trans-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
Trichloroethene	ND	ND	ND	ND	[illegible]
1 Dibromochloromethane	ND	ND	ND	ND	[illegible]
1 1,1,2-Trichloroethane	ND	ND	ND	ND	[illegible]
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
2-Chloroethylvinylether	ND	ND	ND	ND	[illegible]
Bromoform	ND	ND	ND	ND	[illegible]
2 1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	[illegible]
2 Tetrachloroethene	ND	ND	ND	ND	[illegible]
Chlorobenzene	ND	ND	ND	ND	[illegible]
3 Dichlorobenzenes	ND	ND	ND	ND	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	101	106	95	77
Analysis date:	12/19/86	12/19/86	12/19/86	12/19/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 1. Analysis Type: 601 Results
continued

Sample Type: Sample ID#:	LAN 000653	LAN 000654	LAN 000655	LAN 000656	DET [illegible]
Compound	Concentration ug/L				
Chloromethane	ND	ND	ND	ND	[illegible]
Bromomethane	ND	ND	ND	ND	[illegible]
4 Dichlorodifluoromethane	ND	ND	ND	ND	
4 Vinyl Chloride	ND	ND	ND	ND	[illegible]
Chloroethane	ND	ND	ND	ND	[illegible]
Methylene Chloride	1.0 a	1.0 a	ND	ND	[illegible]
Trichlorofluoromethane	ND	ND	ND	ND	[illegible]
1,1-Dichloroethene	ND	ND	ND	ND	[illegible]
1,1-Dichloroethane	ND	ND	ND	ND	[illegible]
trans-1,2-Dichloroethene	ND	ND	ND	ND	[illegible]
Chloroform	ND	ND	ND	ND	[illegible]
1,2-Dichloroethane	ND	ND	ND	ND	[illegible]
1,1,1-Trichloroethane	ND	ND	ND	ND	[illegible]
Carbon Tetrachloride	ND	ND	ND	ND	[illegible]
Bromodichloromethane	ND	ND	ND	ND	[illegible]
1,2-Dichloropropane	ND	ND	ND	ND	[illegible]
trans-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
Trichloroethene	ND	ND	ND	[illegible]	[illegible]
1 Dibromochloromethane	ND	ND	ND	ND	[illegible]
1 1,1,2-Trichloroethane	ND	ND	ND	ND	[illegible]
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
2-Chloroethylvinylether	ND	ND	ND	ND	[illegible]
Bromoform	ND	ND	ND	ND	[illegible]
2 1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	[illegible]
2 Tetrachloroethene	ND	ND	ND	ND	[illegible]
Chlorobenzene	ND	ND	ND	ND	[illegible]
3 Dichlorobenzenes	ND	ND	ND	ND	[illegible]

Detection limit factor:	1.00	1.00	1.00	10.00
Surrogate Recovery %:	72	57	96	67
Analysis date:	12/19/86	12/19/86	12/23/86	12/22/86

1 - these compounds coelute ND - not detected at detection limit times factor
2 - these compounds coelute a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Aerovironment
8612-[illegible]
File # [illegible]

Table 1. Analysis Type: 601 Results
(continued)

	Sample Type:	LAN	LAN	LAN	LAN	DET
	Sample ID#:	000657	000658	000659	000660	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
4	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
4	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	0.6 a	ND	ND	0.8 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	1.9	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	Trichloroethene	0.9 n	25	35	ND	0.5
1	Dibromochloromethane	ND	ND	ND	ND	0.5
1	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
1	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
	Bromoform	ND	ND	ND	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
	Chlorobenzene	ND	ND	ND	ND	0.5
3	Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1.00	2.50	1.00	1.00
Surrogate Recovery %:	105	98	101	91
Analysis date:	12/22/86	12/23/86	12/23/86	12/23/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

[illegible]

Table 1. Analysis Type: 601 Results
continued

	Sample Type:	LAN	DET
	Sample ID#:	000661	999999
	Compound	Concentration ug/L	
	Chloromethane	ND	0.5
	Bromomethane	ND	0.5
4	Dichlorodifluoromethane	ND	0.5
4	Vinyl Chloride	ND	0.5
	Chloroethane	ND	0.5
	Methylene Chloride	ND	0.5
	Trichlorofluoromethane	ND	0.5
	1,1-Dichloroethene	ND	0.5
	1,1-Dichloroethane	ND	0.5
	trans-1,2-Dichloroethene	ND	0.5
	Chloroform	ND	0.5
	1,2-Dichloroethane	ND	0.5
	1,1,1-Trichloroethane	ND	0.5
	Carbon Tetrachloride	ND	0.5
	Bromodichloromethane	ND	0.5
	1,2-Dichloropropane	ND	0.5
	trans-1,3-Dichloropropene	ND	0.5
	Trichloroethene	130	0.5
1	Dibromochloromethane	ND	0.5
1	1,1,2-Trichloroethane	ND	0.5
1	cis-1,3-Dichloropropene	ND	0.5
	2-Chloroethylvinylether	ND	0.5
	Bromoform	ND	0.5
2	1,1,2,2-Tetrachloroethane	ND	0.5
2	Tetrachloroethene	ND	0.5
	Chlorobenzene	ND	0.5
3	Dichlorobenzenes	ND	0.5

Detection limit factor: 2.50

Surrogate Recovery %: 92

Analysis date: 12/23/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

[illegible]

Table 2. Analysis Type: 601 DA

Sample Type:	MB1	MB2	MB3	[illegible]	DET
Sample ID#:	999998	999998	999998	[illegible]	[illegible]
Compound	Concentration ug/L				
Chloromethane	ND	ND	ND	ND	[illegible]
Bromomethane	ND	ND	ND	ND	[illegible]
4 Dichlorodifluoromethane	ND	ND	ND	ND	[illegible]
4 Vinyl Chloride	ND	ND	ND	ND	[illegible]
Chloroethane	ND	ND	ND	ND	[illegible]
Methylene Chloride	ND	2.8 a	ND	ND	[illegible]
Trichlorofluoromethane	ND	ND	ND	ND	[illegible]
1,1-Dichloroethene	ND	ND	ND	ND	[illegible]
1,1-Dichloroethane	ND	ND	ND	ND	[illegible]
trans-1,2-Dichloroethene	ND	ND	ND	ND	[illegible]
Chloroform	ND	ND	ND	ND	[illegible]
1,2-Dichloroethane	ND	ND	ND	ND	[illegible]
1,1,1-Trichloroethane	ND	ND	ND	ND	[illegible]
Carbon Tetrachloride	ND	ND	ND	ND	[illegible]
Bromodichloromethane	ND	ND	ND	ND	[illegible]
1,2-Dichloropropane	ND	ND	ND	ND	[illegible]
trans-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
Trichloroethene	ND	ND	ND	[illegible]	[illegible]
1 Dibromochloromethane	ND	ND	ND	ND	[illegible]
1 1,1,2-Trichloroethane	ND	ND	ND	ND	[illegible]
1 cis-1,3-Dichloropropene	ND	ND	ND	ND	[illegible]
2-Chloroethylvinylether	ND	ND	ND	ND	[illegible]
Bromoform	ND	ND	ND	ND	[illegible]
2 1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	[illegible]
2 Tetrachloroethene	ND	ND	ND	ND	[illegible]
Chlorobenzene	ND	ND	ND	ND	[illegible]
3 Dichlorobenzenes	ND	ND	ND	ND	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	70	97	75	100
Analysis date:	12/19/86	12/22/86	12/23/86	12/23/86

1 - these compounds coelute   ND - not detected at detection limit times factor
2 - these compounds coelute   a - below normal laboratory background levels
3 - mixture of isomers and coelute
4 - these compounds coelute

Table 2. Analysis Type: 601 3A
(continued

Sample Type:	LSP	MSL	DET
Sample ID#:	000649	000649	999999
Compound	Concentration ug/L		
Chloromethane	97 %	10 s	0.5
Bromomethane	83 %	10 s	0.5
4 Dichlorodifluoromethane	120 %	10 s	0.5
4 Vinyl Chloride	120 %	10 s	0.5
Chloroethane	99 %	10 s	0.5
Methylene Chloride	201 %	5 s	0.5
Trichlorofluoromethane	110 %	5 s	0.5
1,1-Dichloroethene	110 %	5 s	0.5
1,1-Dichloroethane	110 %	5 s	0.5
trans-1,2-Dichloroethene	100 %	5 s	0.5
Chloroform	110 %	5 s	0.5
1,2-Dichloroethane	130 %	5 s	0.5
1,1,1-Trichloroethane	110 %	5 s	0.5
Carbon Tetrachloride	110 %	5 s	0.5
Bromodichloromethane	120 %	5 s	0.5
1,2-Dichloropropane	110 %	5 s	0.5
trans-1,3-Dichloropropene	100 %	5 s	0.5
Trichloroethene	110 %	5 s	0.5
1 Dibromochloromethane	100 %	5 s	0.5
1 1,1,2-Trichloroethane	100 %	5 s	0.5
1 cis-1,3-Dichloropropene	100 %	5 s	0.5
2-Chloroethylvinylether	110 %	5 s	0.5
Bromoform	120 %	5 s	0.5
2 1,1,2,2-Tetrachloroethane	97 %	5 s	0.5
2 Tetrachloroethene	97 %	5 s	0.5
Chlorobenzene	100 %	5 s	0.5
3 Dichlorobenzenes	120 %	15 s	0.5

Detection limit factor: 1.00 1.00

Surrogate Recovery %: 104

Analysis date: 12/23/86 12/23/86

1 - these compounds coelute ND - not detected at detection limit times
2 - these compounds coelute a - below normal laboratory background level
3 - mixture of isomers and coelute s - amount spiked in sample
4 - these compounds coelute % - percent recovery from spiked sample

ACUREX Corporation

Environmental Systems Division

AeroVironment
825 Myrtle Avenue
Monrovia, Ca 91016

January 12, 1987
Acurex ID#: Mather AFB
File CON601A

Attention: Chris Lovdahl

Subject: Confirmation of Forty-three water samples for Volatile Halogenated Organics, Received 11/12/86 through 12/15/86

Forty-three water samples were confirmed for halogenated volatile organics according to EPA Method 501 (Federal Register, Volume 49 #209, October 26, 1984; page 29). Results are presented in Table 1. Quality assurance data is presented in Table 2. The method can be summarized as follows:

> Helium is bubbled through a volume of water contained in a specially designed purging chamber at ambient temperature. The purgable halogenated organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable which are then detected with a Hall detector run in series with a photoionization detector. SP-1000 on Carbopak B is used for the primary analysis. Confirmations are run using a Hall detector alone and a column containing n-octane on Porasil C.

If you should have any questions, please do not hesitate to call.

Submitted by: Sarah Schoen
Sarah Schoen, Ph.D.
Staff Chemist

Greg Nicoll
Project Chemist

These results were obtained by following standard laboratory procedures: the liability of Acurex Corporation shall not exceed the amount paid for this report. In no event shall Acurex be liable for special or consequential damages.

AeroVironment
Mather AFB
File CONs 14

Table 1. Analysis Type: 601 Confirmations

	Compound	LAC	LAC	LAC	LAC	DET
	Sample ID#:	000751	000752	000758	000761	999999
		Concentration ug/L				
	Chloromethane	NC	NC	NC	NC	0.5
	Bromomethane	NC	NC	NC	NC	0.5
	Dichlorodifluoromethane	NC	NC	NC	NC	0.5
	Vinyl Chloride	NC	NC	NC	NC	0.5
	Chloroethane	NC	NC	NC	NC	0.5
	Methylene Chloride	NC	NC	NC	NC	0.5
	Trichlorofluoromethane	NC	NC	NC	NC	0.5
	1,1-Dichloroethene	NC	NC	NC	NC	0.5
1	1,1-Dichloroethane	NC	NC	NC	NC	0.5
	trans-1,2-Dichloroethene	NC	NC	NC	NC	0.5
	Chloroform	NC	NC	NC	NC	0.5
	1,2-Dichloroethane	NC	NC	NC	NC	0.5
1	1,1,1-Trichloroethane	NC	NC	NC	NC	0.5
	Carbon Tetrachloride	NC	NC	NC	NC	0.5
2	Bromodichloromethane	NC	NC	NC	NC	0.5
	1,2-Dichloropropane	NC	NC	NC	NC	0.5
	trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
1	Trichloroethene	ND	4.1	160	1000	0.5
	Dibromochloromethane	NC	NC	NC	NC	0.5
	1,1,2-Trichloroethane	NC	NC	NC	NC	0.5
	cis-1,3-Dichloropropene	NC	NC	NC	NC	0.5
	2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3	Bromoform	NC	NC	NC	NC	0.5
4	1,1,2,2-Tetrachloroethane	NC	NC	NC	NC	0.5
2	Tetrachloroethene	NC	NC	NC	NC	0.5
3	Chlorobenzene	NC	NC	NC	NC	0.5
4	Dichlorobenzenes	NC	NC	NC	NC	0.5
	Detection limit factor:	1.00	1.00	5.00	10.00	
	Surrogate Recovery %:	84	71	76	82	
	Analysis date:	11/17/86	11/17/86	11/18/86	11/18/86	

Sample Type: LAC, LAC, LAC, LAC, DET

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Table 1. Analysis Type: 601 Confirmations
(continued)

	Sample Type:	LAC	LAC	LAC	LAC	DET
	Sample ID#:	000762	000764	000765	000766	999999
	Compound	Concentration ug/L				
	Chloromethane	NC	NC	NC	NC	0.5
	Bromomethane	NC	NC	NC	NC	0.5
	Dichlorodifluoromethane	NC	NC	NC	NC	0.5
	Vinyl Chloride	NC	NC	NC	NC	0.5
	Chloroethane	NC	NC	NC	NC	0.5
	Methylene Chloride	NC	NC	NC	NC	0.5
	Trichlorofluoromethane	NC	NC	NC	NC	0.5
	1,1-Dichloroethene	NC	NC	NC	NC	0.5
1	1,1-Dichloroethane	NC	NC	NC	NC	0.5
	trans-1,2-Dichloroethene	NC	NC	NC	NC	0.5
	Chloroform	NC	NC	NC	NC	0.5
	1,2-Dichloroethane	NC	NC	NC	NC	0.5
1	1,1,1-Trichloroethane	NC	NC	NC	NC	0.5
	Carbon Tetrachloride	NC	NC	NC	1.2	0.5
2	Bromodichloromethane	NC	NC	NC	NC	0.5
	1,2-Dichloropropane	NC	NC	NC	NC	0.5
	trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
1	Trichloroethene	1000	13	ND	2.1	0.5
	Dibromochloromethane	NC	NC	NC	NC	0.5
	1,1,2-Trichloroethane	NC	NC	NC	NC	0.5
	cis-1,3-Dichloropropene	NC	NC	NC	NC	0.5
	2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3	Bromoform	NC	NC	NC	NC	0.5
4	1,1,2,2-Tetrachloroethane	NC	NC	NC	ND	0.5
2	Tetrachloroethene	NC	NC	NC	8.2	0.5
3	Chlorobenzene	NC	NC	NC	NC	0.5
4	Dichlorobenzenes	NC	NC	NC	NC	0.5

Detection limit factor:	10.00	1.25	1.00	1.00
Surrogate Recovery %:	82	58	64	77
Analysis date:	11/18/86	11/18/86	11/18/86	11/18/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

[illegible]
[illegible]
[illegible]

Table 1. Analysis Type: 601 Confirmations (continued)

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000770	000772	000773	000775	999999
Compound	Concentration ug/L				
Chloromethane	NC	NC	NC	NC	0.5
Bromomethane	NC	NC	NC	NC	0.5
Dichlorodifluoromethane	NC	NC	NC	NC	0.5
Vinyl Chloride	NC	NC	NC	NC	0.5
Chloroethane	NC	NC	NC	NC	0.5
Methylene Chloride	NC	NC	NC	NC	0.5
Trichlorofluoromethane	NC	NC	NC	NC	0.5
1,1-Dichloroethene	NC	NC	0.8	NC	0.5
1 1,1-Dichloroethane	NC	NC	20	NC	0.5
trans-1,2-Dichloroethene	NC	NC	ND	NC	0.5
Chloroform	NC	4.0	NC	NC	0.5
1,2-Dichloroethane	NC	NC	NC	NC	0.5
1 1,1,1-Trichloroethane	ND	~~NC~~ ND	NC	ND	0.5
Carbon Tetrachloride	NC	NC	NC	NC	0.5
2 Bromodichloromethane	NC	NC	NC	NC	0.5
1,2-Dichloropropane	NC	NC	NC	NC	0.5
trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
1 Trichloroethene	NC	ND	20	NC	0.5
Dibromochloromethane	NC	NC	NC	NC	0.5
1,1,2-Trichloroethane	NC	NC	NC	NC	0.5
cis-1,3-Dichloropropene	NC	NC	NC	NC	0.5
2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3 Bromoform	NC	NC	NC	NC	0.5
4 1,1,2,2-Tetrachloroethane	NC	NC	ND	NC	0.5
2 Tetrachloroethene	NC	NC	3.5	NC	0.5
3 Chlorobenzene	NC	NC	NC	NC	0.5
4 Dichlorobenzenes	NC	NC	NC	NC	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	62	94	93	70
Analysis date:	11/18/86	11/20/86	12/3/86	11/19/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Table 1. Analysis Type: 601 Confirmations
(continued)

Sample Type:	LAC	LAC	LAC	LAC	DET
Sample ID#:	000779	000781	000787	000789	999999
Compound	Concentration ug/L				
Chloromethane	NC	NC	NC	NC	0.5
Bromomethane	NC	NC	NC	NC	0.5
Dichlorodifluoromethane	NC	NC	ND	NC	0.5
Vinyl Chloride	NC	NC	0.8	NC	0.5
Chloroethane	NC	NC	NC	NC	0.5
Methylene Chloride	NC	NC	NC	NC	0.5
Trichlorofluoromethane	NC	NC	NC	NC	0.5
1,1-Dichloroethene	NC	NC	NC	NC	0.5
1 1,1-Dichloroethane	NC	NC	NC	NC	0.5
trans-1,2-Dichloroethene	NC	NC	NC	NC	0.5
Chloroform	NC	NC	NC	NC	0.5
1,2-Dichloroethane	NC	NC	NC	NC	0.5
1 1,1,1-Trichloroethane	ND	ND	NC	3.1	0.5
Carbon Tetrachloride	NC	NC	NC	NC	0.5
2 Bromodichloromethane	NC	NC	NC	NC	0.5
1,2-Dichloropropane	NC	NC	NC	NC	0.5
trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
1 Trichloroethene	NC	NC	4.9	3.1	0.5
Dibromochloromethane	NC	NC	NC	NC	0.5
1,1,2-Trichloroethane	NC	NC	NC	NC	0.5
cis-1,3-Dichloropropene	NC	NC	NC	NC	0.5
2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3 Bromoform	NC	NC	NC	NC	0.5
4 1,1,2,2-Tetrachloroethane	NC	NC	ND	NC	0.5
2 Tetrachloroethene	NC	NC	ND	NC	0.5
3 Chlorobenzene	NC	NC	NC	NC	0.5
4 Dichlorobenzenes	NC	NC	NC	NC	0.5
Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	75	77	67	63	
Analysis date:	11/20/86	11/20/86	11/21/86	11/21/86	

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Table 1. Analysis Type: 601 Confirmations
(continued)

	Sample Type:	LAC	LAC	LAC	LAC	DET
	Sample ID#:	000796	000797	000798	000799	999999
	Compound			Concentration ug/L		
	Chloromethane	NC	NC	NC	NC	0.5
	Bromomethane	NC	NC	NC	NC	0.5
	Dichlorodifluoromethane	NC	NC	ND	ND	0.5
	Vinyl Chloride	NC	NC	5.1	4.7	0.5
	Chloroethane	NC	NC	NC	NC	0.5
	Methylene Chloride	NC	NC	NC	NC	0.5
	Trichlorofluoromethane	NC	NC	NC	NC	0.5
	1,1-Dichloroethene	NC	NC	NC	NC	0.5
1	1,1-Dichloroethane	NC	NC	14	18	0.5
	trans-1,2-Dichloroethene	NC	NC	ND	ND	0.5
	Chloroform	NC	ND	NC	NC	0.5
	1,2-Dichloroethane	NC	NC	3.0	2.8	0.5
1	1,1,1-Trichloroethane	NC	NC	NC	NC	0.5
	Carbon Tetrachloride	NC	NC	NC	NC	0.5
2	Bromodichloromethane	NC	NC	NC	NC	0.5
	1,2-Dichloropropane	NC	NC	0.9	0.8	0.5
	trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
1	Trichloroethene	11	NC	14	18	0.5
	Dibromochloromethane	NC	NC	NC	NC	0.5
	1,1,2-Trichloroethane	NC	NC	NC	NC	0.5
	cis-1,3-Dichloropropene	NC	NC	NC	NC	0.5
	2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3	Bromoform	NC	NC	NC	NC	0.5
4	1,1,2,2-Tetrachloroethane	ND	NC	ND	ND	0.5
2	Tetrachloroethene	2.0	NC	1.2	1.0	0.5
3	Chlorobenzene	NC	NC	NC	NC	0.5
4	Dichlorobenzenes	NC	NC	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	79	63	77	68	
Analysis date:	11/24/86	11/24/86	11/24/86	11/24/86	

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Table 1. Analysis Type: 601 Confirmations
(continued)

	Sample Type:	LAC	LAC	LAC	LAC	DET
	Sample ID#:	000801	000602	000607	000608	999999
	Compound	Concentration ug/L				
	Chloromethane	NC	NC	NC	NC	0.5
	Bromomethane	NC	NC	NC	NC	0.5
	Dichlorodifluoromethane	NC	NC	NC	NC	0.5
	Vinyl Chloride	NC	NC	NC	NC	0.5
	Chloroethane	NC	NC	NC	NC	0.5
	Methylene Chloride	NC	NC	NC	NC	0.5
	Trichlorofluoromethane	NC	NC	NC	NC	0.5
	1,1-Dichloroethene	NC	NC	NC	ND	0.5
1	1,1-Dichloroethane	NC	NC	NC	68	0.5
	trans-1,2-Dichloroethene	NC	NC	ND	ND	0.5
	Chloroform	1.2	NC	NC	NC	0.5
	1,2-Dichloroethane	NC	NC	NC	NC	0.5
1	1,1,1-Trichloroethane	ND	NC	NC	NC	0.5
	Carbon Tetrachloride	NC	NC	NC	NC	0.5
2	Bromodichloromethane	NC	NC	NC	NC	0.5
	1,2-Dichloropropane	NC	NC	NC	NC	0.5
	trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
1	Trichloroethene	NC	3.0	84	68	0.5
	Dibromochloromethane	NC	NC	NC	NC	0.5
	1,1,2-Trichloroethane	NC	NC	NC	NC	0.5
	cis-1,3-Dichloropropene	NC	NC	NC	NC	0.5
	2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3	Bromoform	NC	NC	NC	NC	0.5
4	1,1,2,2-Tetrachloroethane	NC	ND	ND	ND	0.5
2	Tetrachloroethene	NC	8.2	11	14	0.5
3	Chlorobenzene	NC	NC	NC	NC	0.5
4	Dichlorobenzenes	NC	NC	NC	NC	0.5

	000801	000602	000607	000608
Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	54	78	83	99
Analysis date:	11/24/86	12/12/86	12/12/86	12/15/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Aero[illegible]
Mather AFB
File [illegible]

Table 1. Analysis Type: 601 Confirmations
(continued)

	Compound	LAC	LAC	LAC	LAC	DET
	Sample ID#:	000614	000617	000623	000628	999999
		Concentration ug/L				
	Chloromethane	NC	NC	NC	NC	0.5
	Bromomethane	NC	NC	NC	NC	0.5
	Dichlorodifluoromethane	ND	NC	NC	NC	0.5
	Vinyl Chloride	1.3	NC	NC	NC	0.5
	Chloroethane	NC	NC	NC	NC	0.5
	Methylene Chloride	NC	NC	NC	NC	0.5
	Trichlorofluoromethane	NC	NC	NC	NC	0.5
	1,1-Dichloroethene	NC	NC	NC	NC	0.5
1	1,1-Dichloroethane	NC	NC	NC	NC	0.5
	trans-1,2-Dichloroethene	ND	NC	NC	NC	0.5
	Chloroform	NC	NC	1.5	NC	0.5
	1,2-Dichloroethane	NC	NC	NC	3.7	0.5
1	1,1,1-Trichloroethane	NC	NC	NC	NC	0.5
	Carbon Tetrachloride	NC	NC	NC	NC	0.5
2	Bromodichloromethane	NC	NC	NC	NC	0.5
	1,2-Dichloropropane	NC	NC	NC	NC	0.5
	trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
2	Trichloroethene	21	NC	NC	NC	0.5
	Dibromochloromethane	NC	NC	NC	NC	0.5
	1,1,2-Trichloroethane	NC	NC	NC	NC	0.5
	cis-1,3-Dichloropropene	NC	NC	NC	NC	0.5
	2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3	Bromoform	NC	NC	NC	NC	0.5
4	1,1,2,2-Tetrachloroethane	ND	ND	NC	NC	0.5
3	Tetrachloroethene	2.5	1.1	NC	NC	0.5
3	Chlorobenzene	NC	NC	NC	NC	0.5
4	Dichlorobenzenes	NC	NC	NC	NC	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	70	79	92	86
Analysis date:	12/18/86	12/15/86	12/15/86	12/15/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

[illegible]
Mather AFB
File [illegible]

Table 1. Analysis Type: Vol Confirmations
(continued)

	Sample Type:	LAC	LAC	LAC	LAC	DET
	Sample ID#:	000631	000632	000634	000635	999999
	Compound			Concentration ug/L		
	Chloromethane	NC	NC	NC	NC	.5
	Bromomethane	NC	NC	NC	NC	.5
	Dichlorodifluoromethane	NC	NC	ND	NC	0.5
	Vinyl Chloride	NC	NC	0.8	NC	0.5
	Chloroethane	NC	NC	NC	NC	0.5
	Methylene Chloride	NC	NC	NC	NC	0.5
	Trichlorofluoromethane	NC	NC	NC	NC	0.5
	1,1-Dichloroethene	NC	NC	NC	NC	0.5
1	1,1-Dichloroethane	NC	NC	NC	NC	0.5
	trans-1,2-Dichloroethene	NC	NC	ND	NC	0.5
	Chloroform	NC	NC	NC	ND	0.5
	1,2-Dichloroethane	NC	NC	NC	NC	0.5
1	1,1,1-Trichloroethane	NC	NC	NC	NC	0.5
	Carbon Tetrachloride	NC	NC	NC	NC	0.5
2	Bromodichloromethane	NC	NC	NC	NC	0.5
	1,2-Dichloropropane	NC	NC	NC	NC	0.5
	trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
1	Trichloroethene	3.1	12	6.8	NC	0.5
	Dibromochloromethane	NC	NC	NC	NC	0.5
	1,1,2-Trichloroethane	NC	NC	NC	NC	0.5
	cis-1,3-Dichloropropene	NC	NC	NC	NC	0.5
	2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3	Bromoform	NC	NC	NC	NC	0.5
4	1,1,2,2-Tetrachloroethane	ND	ND	ND	NC	0.5
2	Tetrachloroethene	0.9	1.7	0.6	NC	0.5
3	Chlorobenzene	NC	NC	NC	NC	0.5
4	Dichlorobenzenes	NC	NC	NC	NC	0.5
	Detection limit factor:	1.00	1.00	1.00	1.00	
	Surrogate Recovery %:	80	80	87	89	
	Analysis date:	12/16/86	12/16/86	12/16/86	12/16/86	

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Table 1. Analysis Type: 601 Confirmations (continued)

	Sample Type:	LAC	LAC	LAC	LAC	ERR DET
	Sample ID#:	000636	000638	000644	000647	[illegible]
	Compound	Concentration ug/L				
	Chloromethane	NC	NC	NC	NC	0.5
	Bromomethane	NC	NC	NC	NC	0.5
	Dichlorodifluoromethane	NC	NC	NC	NC	0.5
	Vinyl Chloride	NC	NC	NC	NC	0.5
	Chloroethane	NC	NC	NC	NC	0.5
	Methylene Chloride	NC	NC	NC	NC	0.5
	Trichlorofluoromethane	NC	NC	NC	NC	0.5
	1,1-Dichloroethene	NC	NC	NC	NC	0.5
1	1,1-Dichloroethane	NC	NC	NC	NC	0.5
	trans-1,2-Dichloroethene	NC	NC	NC	NC	0.5
	Chloroform	4.2	NC	NC	NC	0.5
	1,2-Dichloroethane	NC	NC	NC	NC	0.5
1	1,1,1-Trichloroethane	0.8	ND	NC	NC	0.5
	Carbon Tetrachloride	NC	NC	NC	NC	0.5
2	Bromodichloromethane	NC	NC	NC	NC	0.5
	1,2-Dichloropropane	NC	NC	NC	NC	0.5
	trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
1	Trichloroethene	NC	NC	4.3	2.1	0.5
	Dibromochloromethane	NC	NC	NC	NC	0.5
	1,1,2-Trichloroethane	NC	NC	NC	NC	0.5
	cis-1,3-Dichloropropene	NC	NC	NC	NC	0.5
	2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3	Bromoform	NC	NC	NC	NC	0.5
4	1,1,2,2-Tetrachloroethane	NC	NC	NC	NC	0.5
2	Tetrachloroethene	NC	NC	NC	NC	0.5
3	Chlorobenzene	NC	NC	NC	NC	0.5
4	Dichlorobenzenes	NC	NC	NC	NC	0.5

Detection limit factor:	1.00	1.00	1.00	1.00	
Surrogate Recovery %:	81	70	60	95	
Analysis date:	12/16/86	12/16/86	12/19/86	12/19/86	

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Aero[illegible]
Matter 4[illegible]
File [illegible]

Table 1. Analysis Type: 601 Confirmations
(continued)

	Sample Type:	LAC	LAC	LAC	LAC	DET
	Sample ID#:	000648	000656	000657	000658	[illegible]
	Compound	Concentration ug/L				
	Chloromethane	NC	NC	NC	NC	0.5
	Bromomethane	NC	NC	NC	NC	0.5
	Dichlorodifluoromethane	NC	NC	NC	NC	0.5
	Vinyl Chloride	NC	NC	NC	NC	0.5
	Chloroethane	NC	NC	NC	NC	0.5
	Methylene Chloride	NC	NC	NC	NC	0.5
	Trichlorofluoromethane	NC	NC	NC	NC	0.5
	1,1-Dichloroethene	NC	NC	NC	NC	0.5
1	1,1-Dichloroethane	NC	NC	NC	NC	0.5
	trans-1,2-Dichloroethene	NC	NC	NC	NC	0.5
	Chloroform	NC	NC	NC	NC	0.5
	1,2-Dichloroethane	NC	NC	NC	NC	0.5
1	1,1,1-Trichloroethane	NC	NC	NC	NC	0.5
	Carbon Tetrachloride	NC	NC	NC	NC	0.5
2	Bromodichloromethane	2.1	NC	NC	NC	0.5
	1,2-Dichloropropane	NC	NC	NC	NC	0.5
	trans-1,3-Dichloropropene	NC	NC	NC	NC	0.5
1	Trichloroethene	NC	790	ND	68	0.5
	Dibromochloromethane	8.0	NC	NC	NC	0.5
	1,1,2-Trichloroethane	ND	NC	NC	NC	0.5
	cis-1,3-Dichloropropene	ND	NC	NC	NC	0.5
	2-Chloroethylvinylether	NC	NC	NC	NC	0.5
3	Bromoform	3.0	NC	NC	NC	0.5
4	1,1,2,2-Tetrachloroethane	NC	NC	NC	NC	0.5
2	Tetrachloroethene	NC	NC	NC	NC	0.5
3	Chlorobenzene	NC	NC	NC	NC	0.5
4	Dichlorobenzenes	NC	NC	NC	NC	0.5

Detection limit factor:	1.00	10.00	1.00	2.50
Surrogate Recovery %:	101	67	53	82
Analysis date:	12/19/86	12/22/86	12/22/86	12/22/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Table 1. Analysis Type: 601 Confirmations
(continued)

	Sample Type:	LAC	LAC	LAC	DET
	Sample ID#:	000659	000660	000661	999999
	Compound	Concentration ug/L			
	Chloromethane	NC	NC	NC	0.5
	Bromomethane	NC	NC	NC	0.5
	Dichlorodifluoromethane	NC	NC	NC	0.5
	Vinyl Chloride	NC	NC	NC	0.5
	Chloroethane	NC	NC	NC	0.5
	Methylene Chloride	NC	NC	NC	0.5
	Trichlorofluoromethane	NC	NC	NC	0.5
	1,1-Dichloroethene	NC	NC	NC	0.5
1	1,1-Dichloroethane	NC	NC	NC	0.5
	trans-1,2-Dichloroethene	NC	NC	NC	0.5
	Chloroform	NC	5.4	NC	0.5
	1,2-Dichloroethane	NC	NC	NC	0.5
1	1,1,1-Trichloroethane	NC	NC	NC	0.5
	Carbon Tetrachloride	NC	NC	NC	0.5
2	Bromodichloromethane	NC	NC	NC	0.5
	1,2-Dichloropropane	NC	NC	NC	0.5
	trans-1,3-Dichloropropene	NC	NC	NC	0.5
1	Trichloroethene	25	NC	95	0.5
	Dibromochloromethane	NC	NC	NC	0.5
	1,1,2-Trichloroethane	NC	NC	NC	0.5
	cis-1,3-Dichloropropene	NC	NC	NC	0.5
	2-Chloroethylvinylether	NC	NC	NC	0.5
3	Bromoform	NC	NC	NC	0.5
4	1,1,2,2-Tetrachloroethane	NC	NC	NC	0.5
2	Tetrachloroethene	NC	NC	NC	0.5
3	Chlorobenzene	NC	NC	NC	0.5
4	Dichlorobenzenes	NC	NC	NC	0.5

Detection limit factor:	1.00	1.00	1.00
Surrogate Recovery %:	57	62	69
Analysis date:	12/22/86	12/22/86	12/22/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

[illegible]
Mather AFB
File [illegible]

Table 2. Analysis Type: 601 Confirmation C4

Sample Type:	MB1	MB2	MB3	MB4	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound	Concentration ug/L				
Chloromethane	ND	ND	ND	ND	0.5
Bromomethane	ND	ND	ND	ND	0.5
Dichlorodifluoromethane	ND	ND	2.5	ND	0.5
Vinyl Chloride	ND	ND	ND	ND	0.5
Chloroethane	ND	ND	ND	ND	0.5
Methylene Chloride	1.3 a	2.3 a	1.4 a	3.2 a	0.5
Trichlorofluoromethane	ND	ND	ND	ND	0.5
1,1-Dichloroethene	ND	ND	ND	ND	0.5
1 1,1-Dichloroethane	ND	ND	ND	ND	0.5
trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
Chloroform	ND	ND	ND	ND	0.5
1,2-Dichloroethane	ND	ND	ND	ND	0.5
1 1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
Carbon Tetrachloride	ND	ND	ND	ND	0.5
2 Bromodichloromethane	ND	ND	ND	ND	0.5
1,2-Dichloropropane	ND	ND	ND	ND	0.5
trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
1 Trichloroethene	ND	ND	ND	ND	0.5
Dibromochloromethane	ND	ND	ND	ND	0.5
1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
2-Chloroethylvinylether	ND	ND	ND	ND	0.5
3 Bromoform	ND	ND	ND	ND	0.5
4 1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2 Tetrachloroethene	ND	ND	ND	ND	0.5
3 Chlorobenzene	ND	ND	ND	ND	0.5
4 Dichlorobenzenes	ND	ND	ND	ND	0.5

Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	68	77	65	83
Analysis date:	11/17/86	11/18/86	11/19/86	11/20/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Table 2. Analysis Type: 601 Confirmation QA
(continued)

	Sample Type:	MB5	MB6	MB7	MB8	DET
	Sample ID#:	999998	999998	999998	999998	[illegible]
	Compound			Concentration ug/L		
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	NC	0.5
	Dichlorodifluoromethane	ND	ND	ND	5.1	0.5
	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	8.2 a	1.5 a	2.9 a	28 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
1	1,1-Dichloroethane	ND	ND	3.0	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
1	1,1,1-Trichloroethane	ND	ND	3.0	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
2	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
1	Trichloroethene	ND	ND	3.0	ND	0.5
	Dibromochloromethane	ND	ND	ND	ND	0.5
	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
3	Bromoform	ND	ND	ND	ND	0.5
4	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
3	Chlorobenzene	ND	ND	ND	ND	0.5
4	Dichlorobenzenes	ND	ND	ND	ND	0.5

	MB5	MB6	MB7	MB8
Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	52	79	67	70
Analysis date:	11/21/86	11/24/86	12/3/86	12/12/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Table 2. Analysis Type: 601 Confirmation CA
(continued)

	Sample Type:	MB9	MB10	MB11	MB12	DET
	Sample ID#:	999998	999998	999998	999998	999999
	Compound	Concentration ug/L				
	Chloromethane	ND	ND	ND	ND	0.5
	Bromomethane	ND	ND	ND	ND	0.5
	Dichlorodifluoromethane	ND	ND	ND	ND	0.5
	Vinyl Chloride	ND	ND	ND	ND	0.5
	Chloroethane	ND	ND	ND	ND	0.5
	Methylene Chloride	1.8 a	ND	2.7 a	2.1 a	0.5
	Trichlorofluoromethane	ND	ND	ND	ND	0.5
	1,1-Dichloroethene	ND	ND	ND	ND	0.5
1	1,1-Dichloroethane	ND	ND	ND	ND	0.5
	trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5
	Chloroform	ND	ND	ND	ND	0.5
	1,2-Dichloroethane	ND	ND	ND	ND	0.5
1	1,1,1-Trichloroethane	ND	ND	ND	ND	0.5
	Carbon Tetrachloride	ND	ND	ND	ND	0.5
2	Bromodichloromethane	ND	ND	ND	ND	0.5
	1,2-Dichloropropane	ND	ND	ND	ND	0.5
	trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5
1	Trichloroethene	ND	ND	ND	ND	0.5
	Dibromochloromethane	ND	ND	ND	ND	0.5
	1,1,2-Trichloroethane	ND	ND	ND	ND	0.5
	cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5
	2-Chloroethylvinylether	ND	ND	ND	ND	0.5
3	Bromoform	ND	ND	ND	ND	0.5
4	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5
2	Tetrachloroethene	ND	ND	ND	ND	0.5
3	Chlorobenzene	ND	ND	ND	ND	0.5
4	Dichlorobenzenes	ND	ND	ND	ND	0.5

	MB9	MB10	MB11	MB12
Detection limit factor:	1.00	1.00	1.00	1.00
Surrogate Recovery %:	86	72	59	69
Analysis date:	12/15/86	12/16/86	12/18/86	12/19/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

Table 2. Analysis Type: 601 Confirmation QA (continued)

	Compound	MB13	DET
	Sample Type:	MB13	DET
	Sample ID#:	999998	999999
		Concentration ug/L	
	Chloromethane	ND	0.5
	Bromomethane	ND	0.5
	Dichlorodifluoromethane	ND	0.5
	Vinyl Chloride	ND	0.5
	Chloroethane	ND	0.5
	Methylene Chloride	2.3 a	0.5
	Trichlorofluoromethane	ND	0.5
	1,1-Dichloroethene	ND	0.5
1	1,1-Dichloroethane	ND	0.5
	trans-1,2-Dichloroethene	ND	0.5
	Chloroform	ND	0.5
	1,2-Dichloroethane	ND	0.5
1	1,1,1-Trichloroethane	ND	0.5
	Carbon Tetrachloride	ND	0.5
2	Bromodichloromethane	ND	0.5
	1,2-Dichloropropane	ND	0.5
	trans-1,3-Dichloropropene	ND	0.5
1	Trichloroethene	ND	0.5
	Dibromochloromethane	ND	0.5
	1,1,2-Trichloroethane	ND	0.5
	cis-1,3-Dichloropropene	ND	0.5
	2-Chloroethylvinylether	ND	0.5
3	Bromoform	ND	0.5
4	1,1,2,2-Tetrachloroethane	ND	0.5
2	Tetrachloroethene	ND	0.5
3	Chlorobenzene	ND	0.5
4	Dichlorobenzenes	ND	0.5

Detection limit factor: 1.00

Surrogate Recovery %: 74

Analysis date: 12/22/86

1 - these compounds coelute
2 - these compounds coelute
3 - these compounds coelute
4 - these compounds coelute

ND - not detected at detection limit times factor
a - below normal laboratory background levels
NC - not being confirmed

ACUREX Corporation

Energy & Environmental Division

December 3, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed by atomic absorption spectrophotometry for arsenic using EPA method 206.2, mercury using EPA method 245.1, and selenium using EPA method 270.2. The sample preparation for arsenic and selenium determinations included concentrating the sample aliquot by a factor of five in order to obtain requested detection limits. The results are presented in Table 1 with QA results in Table 2.

Prepared by: Patrick M. Hirata
Patrick M. Hirata
Chemist

Approved by: Greg Nicoll
Greg Nicoll
Manager, Inorganic Chemistry

485 Clyde Avenue, PO Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

Table 1. Analysis Type: Atomic Absorption Metals Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000784	000785	000786	000787	999999
Compound	Concentration, ugL				
Arsenic, As	ND	ND	ND	ND	[illegible]
Mercury, Hg	ND	ND	ND	ND	[illegible]
Selenium, Se	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date (As,Hg):	11/26/86	11/26/86	11/26/86	11/26/86	
Analysis date (Se):	12/01/86	12/01/86	12/01/86	12/01/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: Atomic Absorption Metals Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000788	000789	000790	000791	999999
Compound	Concentration, ugL				
Arsenic, As	ND	ND	ND	ND	2
Mercury, Hg	ND	ND	ND	ND	0.2
Selenium, Se	ND	ND	ND	ND	2
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date (As,Hg):	11/26/86	11/26/86	11/26/86	11/26/86	
Analysis date (Se):	12/01/86	12/01/86	12/01/86	12/01/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: Atomic Absorption Metals Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000792	000793	000794	000795	999999
Compound	Concentration, ugL				
Arsenic, As	ND	ND	ND	ND	[illegible]
Mercury, Hg	ND	ND	ND	ND	[illegible]
Selenium, Se	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date (As,Hg):	11/26/86	11/26/86	11/26/86	11/26/86	
Analysis date (Se):	12/01/86	12/01/86	12/01/86	12/01/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: Atomic Absorption Metals Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000796	000797	000798	000799	999999
Compound	Concentration, ugL				
Arsenic, As	ND	ND	ND	ND	1
Mercury, Hg	ND	ND	ND	ND	[illegible]
Selenium, Se	ND	ND	ND	ND	1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date (As,Hg):	11/26/86	11/26/86	11/26/86	11/26/86	
Analysis date (Se):	12/01/86	12/01/86	12/01/86	12/01/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: Atomic Absorption Metals Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000800	000801	999999
Compound	Concentration, ug/L		
Arsenic, As	5	ND	2
Mercury, Hg	ND	ND	0.2
Selenium, Se	ND	ND	2
Detection limit factor:	1.00	1.00	
Analysis date (As,Hg):	11/26/86	11/26/86	
Analysis date (Se):	12/01/86	12/01/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: Atomic Absorption Metals In

Sample Type:	MB1	MB2	MB3	LDU	DET
Sample ID#:	999998	999998	999998	000784	999999
Compound	Concentration, ugL				
Arsenic, As	ND	ND	ND	NA	1
Mercury, Hg	ND	NA	NA	ND	0.1
Selenium, Se	ND	ND	ND	NA	1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date (As,Hg):	11/26/86	11/26/86	11/26/86	11/26/86	
Analysis date (Se):	12/01/86	12/01/86	12/01/86	12/01/86	

ND - not detected at detection limit times factor
NA - not analyzed

Table 2. Analysis Type: Atomic Absorption Metals IA

Sample Type:	LDU	LDU	LSP	MSL	DET
Sample ID#:	000790	000795	000801	000801	999999
Compound	Concentration, ugL				
Arsenic, As	ND	NA	94 %	200 s	2
Mercury, Hg	NA	ND	115 %	20 s	0.2
Selenium, Se	ND	NA	96 %	200 s	2
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date (As,Hg):	11/26/86	11/26/86	11/26/86	11/26/86	
Analysis date (Se):	12/01/86	12/01/86	12/01/86	12/01/86	

ND - not detected at detection limit times factor
NA - not analyzed
% - percent recovery from spiked sample
s - amount spiked in sample

ACUREX Corporation

Energy & Environmental Division

December 18, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed by atomic absorption spectrophotometry for arsenic using EPA method 206.2, mercury using EPA method 245.1, and selenium using EPA method 270.2. The sample preparation for arsenic and selenium determinations included concentrating the sample aliquot by a factor of five in order to obtain requested detection limits. The results are presented in Table 1 with QA results in Table 2.

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Approved by: Greg Nicoll
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Manager, Inorganic Chemistry

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Harding ...
Matter ...
December ...

Table 1. Analysis Type: Atomic Absorption Metals Res...

Sample Type:	CAN	CAN	CAN	CAN	DET
Sample ID#:	000510	000511	000512	000513	[illegible]
Compound	Concentration, ug/L				
Arsenic, As	ND	ND	ND	ND	[illegible]
Mercury, Hg	ND	ND	ND	ND	[illegible]
Selenium, Se	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND = not detected at detection limit times factor

[illegible]
[illegible]
[illegible]

Table 1. Analysis Type: Atomic Absorption Metals [illegible]

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	Concentration, ug/L				
Arsenic, As	ND	ND	ND	ND	
Mercury, Hg	ND	ND	ND	ND	[illegible]
Selenium, Se	ND	ND	ND	ND	[illegible]
Detection Limit Factor:	1.0	1.0	1.0	1.0	
Analysis Date:	12/17/85	12/17/85	12/17/85	12/17/85	

ND = not detected at detection limit times factor

[illegible]
[illegible]
December [illegible]

Table 1. Analysis Type: Atomic Absorption Metals Res[illegible]

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	Concentration, ug/L				
Arsenic, As	ND	ND	ND	[illegible]	[illegible]
Mercury, Hg	ND	ND	ND	ND	[illegible]
Selenium, Se	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.[illegible]	1.00	1.[illegible]	1.[illegible]	
Analysis date:	12 17 86	12 17 86	12 17 86	12 17 86	

ND = not detected at detection limit times factor

Table 1. Analysis Type: Atomic Absorption Metals [illegible]

Sample Type:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sample ID#:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	Concentration, [illegible]				
Arsenic, As	ND	ND	ND	ND	[illegible]
Mercury, Hg	ND	ND	ND	ND	[illegible]
Selenium, Se	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	[illegible]	[illegible]	[illegible]	
Analysis date:	12/17 [illegible]	12 17 [illegible]	12 17 [illegible]	12 17 [illegible]	

ND - not detected at detection limit times factor

Table 1. Analysis Type: Atomic Absorption Metals [illegible]

Sample Type:	LAN	LAN	DET
Sample ID#:	000640	000641	999999
Compound	Concentration, ug/L		
Arsenic, As	ND	ND	2
Mercury, Hg	ND	ND	0.2
Selenium, Se	ND	ND	2
Detection limit factor:	1.00	1.00	
Analysis date:	12/17/86	12/17/86	

ND - not detected at detection limit times factor

Report [illegible]
Matter [illegible]
December [illegible]

Table 2. Analysis Type: Atomic Absorption Metals [illegible]

Sample Type:	MB1	MB2	MB3	LCS	DET
Sample ID#:	999999	999999	999999	[illegible]	[illegible]
Compound	Concentration, ug/L				
Arsenic, As	ND	ND	ND	ND	[illegible]
Mercury, Hg	ND	ND	ND	ND	[illegible]
Selenium, Se	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND = not detected at detection limit times factor

Hercules [illegible]
Mather [illegible]
December [illegible]

Table 1. Analysis Type: Atomic Absorption Metals [illegible]

Sample Type:	LSP	LSP	DET
Sample ID#:	[illegible]	[illegible]0541	999999
Compound	Concentration, ug/L		
Arsenic, As	9[illegible] %	NS	[illegible]
Mercury, Hg	NS	9[illegible] %	[illegible]
Selenium, Se	114 %	NS	[illegible]

Detection Limit Factor: [illegible] 1.00

Analysis date: 12/17/86 12/17/86

ND - not detected at detection limit times factor
NS - Not spiked
% - Percent spike recovery (As and Se spiked at 100 ug/L, Hg spiked at 2[illegible] ug/L

ACUREX Corporation

Energy & Environmental Division

January 23, 1987

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed for metals by EPA method 200.7 using two inductivly-coupled argon plasma spectrometers. Barium was determined on a sequential ICAP unit as the first instrument (a simultaneous ICAP) was not set up for barium. The determination of chromium showed about 20 ug/L of chromium in the samples as well as the method blanks. Therefore the chromium results in the area of 20 ug/L should be regarded with caution. The results are presented in Table 1 with QA results in Table 2.

Submitted by: for - Greg Nicoll

Patrick M. Hirata
Chemist

Greg Nicoll
Manager, Inorganic Chemistry

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

AeroVironment
8011-044
met1144a

Table 1.   Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000784	000785	000786	000787	999999
Compound	Concentration ug/L				
Barium, Ba	500	120	84	91	2
Cadmium, Cd	ND	ND	ND	ND	4
Chromium, Cr	20	13	18	20	7
Lead, Pb	ND	ND	ND	ND	40
Silver, Ag	ND	ND	ND	ND	7

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87	01/20/87	01/20/87

ND - not detected at detection limit times factor

AeroVironment
8511-044
met1144b

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000788	000789	999999
Compound	Concentration ug/L		
Barium, Ba	65	190	2
Cadmium, Cd	ND	ND	4
Chromium, Cr	18	21	7
Lead, Pb	ND	ND	40
Silver, Ag	ND	ND	7

Detection limit factor:	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87

ND - not detected at detection limit times factor

Table 2. Analysis Type: 200.7 Metal QA

Sample Type:	MB1	LDU	DET
Sample ID#:	999998	000784	999999
Compound	**Concentration ug/L**		
Barium, Ba	ND	500	2
Cadmium, Cd	ND	ND	4
Chromium, Cr	20	21	7
Lead, Pb	ND	ND	40
Silver, Ag	ND	ND	7

Detection limit factor:	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87

ND - not detected at detection limit times factor

AeroVironment
8611-047
met1147a

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000790	000791	000792	000793	999999
Compound	Concentration ug/L				
Barium, Ba	88	19	150	140	2
Cadmium, Cd	ND	ND	ND	ND	4
Chromium, Cr	18	20	14	18	7
Lead, Pb	ND	ND	ND	ND	40
Silver, Ag	ND	ND	ND	ND	7
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date (Ba):	01/21/87	01/21/87	01/21/87	01/21/87	
Analysis date (Others):	01/20/87	01/20/87	01/20/87	01/20/87	

ND - not detected at detection limit times factor

Aerovironment
8611-047
met1147b

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000794	000795	999999
Compound	Concentration ug/L		
Barium, Ba	74	87	2
Cadmium, Cd	ND	ND	4
Chromium, Cr	21	36	7
Lead, Pb	ND	ND	40
Silver, Ag	ND	ND	7

Detection limit factor:	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87

ND - not detected at detection limit times factor

Aerovironment
8611-047
met1147c

Table 2. Analysis Type: 200.7 Metal QA

Sample Type:	MB1	LDU	DET
Sample ID#:	999998	000794	999999
Compound	Concentration ug/L		
Barium, Ba	ND	72	2
Cadmium, Cd	ND	ND	4
Chromium, Cr	21	39	7
Lead, Pb	ND	ND	40
Silver, Ag	ND	ND	7

Detection limit factor:	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000796	000797	000798	000799	999999
Compound	Concentration ug/L				
Barium, Ba	120	43	110	53	[illegible]
Cadmium, Cd	ND	ND	ND	ND	4
Chromium, Cr	22	21	21	17	[illegible]
Lead, Pb	ND	ND	ND	ND	40
Silver, Ag	ND	ND	ND	ND	7

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87	01/20/87	01/20/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000800	000801	999999
Compound	Concentration ug/L		
Barium, Ba	68	20	2
Cadmium, Cd	ND	ND	4
Chromium, Cr	20	23	7
Lead, Pb	ND	ND	40
Silver, Ag	ND	ND	7

Detection limit factor:	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87

ND - not detected at detection limit times factor

Aerovironment
8611-050
met115dc

Table 2. Analysis Type: 200.7 Metal QA

Sample Type:	MB1	LSP	DET
Sample ID#:	999998	000799	999999
Compound	Concentration ug/L		
Barium, Ba	ND	96 %	2
Cadmium, Cd	ND	96 %	4
Chromium, Cr	22	99 %	7
Lead, Pb	ND	95 %	40
Silver, Ag	ND	62 %	7

Detection limit factor:	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87

ND - not detected at detection limit times factor
% - percent spike recovery (spiked at 2000 ug/L)

AeroVironment
8612-015
met1215a

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000610	000611	000612	000613	999999
Compound	Concentration ug/L				
Barium, Ba	100	38	34	32	[illegible]
Cadmium, Cd	ND	ND	ND	ND	4
Chromium, Cr	20	20	21	18	[illegible]
Lead, Pb	ND	ND	ND	ND	4[illegible]
Silver, Ag	ND	ND	ND	ND	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87	01/20/87	01/20/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	DET
Sample ID#:	000614	999999
Compound	Concentration ug/L	
Barium, Ba	63	2
Cadmium, Cd	ND	4
Chromium, Cr	14	7
Lead, Pb	ND	40
Silver, Ag	ND	7

Detection limit factor: 1.00

Analysis date (Ba): 01/21/87
Analysis date (Others): 01/20/87

ND - not detected at detection limit times factor

Aerovironment
8612-215
met1215c

Table 2. Analysis Type: 200.7 Metal QA

Sample Type:	MB1	DET
Sample ID#:	999998	999999
Compound	Concentration ug/L	
Barium, Ba	ND	2
Cadmium, Cd	ND	4
Chromium, Cr	20	7
Lead, Pb	ND	40
Silver, Ag	ND	7

Detection limit factor: 1.00

Analysis date (Ba): 01/21/87
Analysis date (Others): 01/20/87

ND - not detected at detection limit times factor

AeroVironment
8612-020
met122.a

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000629	000630	000631	000632	999999
Compound		Concentration ug/L			
Barium, Ba	44	100	220	51	2
Cadmium, Cd	ND	ND	ND	ND	4
Chromium, Cr	20	19	20	19	7
Lead, Pb	ND	ND	ND	ND	40
Silver, Ag	ND	ND	ND	ND	7

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (Others):	01/21/87	01/21/87	01/21/87	01/21/87

ND - not detected at detection limit times factor

AeroVironment
8612-020
met1220b

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000633	000634	000635	000636	999999
Compound	Concentration ug/L				
Barium, Ba	27	46	38	10	2
Cadmium, Cd	ND	ND	ND	ND	4
Chromium, Cr	20	20	19	20	7
Lead, Pb	ND	ND	ND	ND	40
Silver, Ag	ND	ND	ND	ND	7

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (Others):	01/21/87	01/21/87	01/21/87	01/21/87

ND - not detected at detection limit times factor

Aerovironment
8612-020
met1220c

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000637	000638	999999
Compound	Concentration ug/L		
Barium, Ba	99	130	2
Cadmium, Cd	ND	ND	4
Chromium, Cr	20	20	7
Lead, Pb	ND	ND	40
Silver, Ag	ND	ND	7

Detection limit factor:	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/21/87	01/21/87

ND - not detected at detection limit times factor

Table 2. Analysis Type: 200.7 Metal QA

Sample Type:	MB1	LDU	DET
Sample ID#:	999998	000633	999999
Compound	Concentration ug/L		
Barium, Ba	ND	29	2
Cadmium, Cd	ND	ND	4
Chromium, Cr	20	20	7
Lead, Pb	ND	ND	40
Silver, Ag	ND	ND	7

Detection limit factor:	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/21/87	01/21/87

ND - not detected at detection limit times factor

Aerovironment
8612-022
met1222a

Table 1. Analysis Type: 200.7 Metal Results

Sample Type:	LAN	LAN	LAN	DET
Sample ID#:	000639	000640	000641	999999
Compound	Concentration ug/L			
Barium, Ba	200	220	100	2
Cadmium, Cd	ND	ND	ND	4
Chromium, Cr	15	16	13	7
Lead, Pb	ND	ND	ND	40
Silver, Ag	ND	ND	ND	7

Detection limit factor:	1.00	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87	01/21/87
Analysis date (Others):	01/21/87	01/21/87	01/21/87

ND - not detected at detection limit times factor

Table 2. Analysis Type: 200.7 Metal QA

Sample Type:	MB1	LDU	LSP	DET
Sample ID#:	999998	000640	000641	999999
Compound		Concentration ug/L		
Barium, Ba	ND	230	95 %	2
Cadmium, Cd	ND	ND	98 %	4
Chromium, Cr	15	13	99 %	7
Lead, Pb	ND	ND	96 %	40
Silver, Ag	ND	ND	66 %	7

Detection limit factor:	1.00	1.00	1.00
Analysis date (Ba):	01/21/87	01/21/87	01/21/87
Analysis date (Others):	01/21/87	01/21/87	01/21/87

ND - not detected at detection limit times factor
% - percent spike recovery (spiked at 2000 ug/L)

ACUREX Corporation

Energy & Environmental Division

January 23, 1987

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed for minerals by EPA method 200.7 using an inductivly-coupled argon plasma spectrometer. Potassium was determined by atomic absorption spectrometry in order to meet the desired detection limit. The detection limit for potassium is the AA detection limits which is lower than the ICAP method detection limit. The results are presented in Table 1 with QA results in Table 2.

Submitted by: [signature] for [signature]

Patrick M. Hirata
Chemist

Greg Nicoll
Manager, Inorganic Chemistry

485 Clyde Avenue, PO Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

Aerovironment
8611-030
min1130a

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000751	000752	000753	000754	999999
Compound	Concentration mg/L				
Calcium, Ca	8.3	11	7.2	7.8	0.01
Iron, Fe	0.037	0.074	0.3	0.11	0.007
Magnesium, Mg	4.4	4.7	3.1	3.1	0.03
Manganese, Mn	0.06	0.008	ND	ND	0.002
Potassium, K (by AA)	1.7	2.6	4.4	2.6	0.01
Sodium, Na	11	19	17	14	0.03
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87	
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87	

ND - not detected at detection limit times factor

Aerovironment
8611-030
min1130b

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000755	000756	000757	000758	999999
Compound	Concentration mg/L				
Calcium, Ca	5.7	8.5	4.6	6.2	0.01
Iron, Fe	0.043	0.05	0.15	2.2	0.007
Magnesium, Mg	1.1	4.5	1.2	2.1	0.03
Manganese, Mn	ND	0.022	ND	0.58	0.002
Potassium, K (by AA)	3.7	1.9	2.3	0.8	0.01
Sodium, Na	17	13	44	9.7	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	DET
Sample ID#:	999998	999999
Compound	**Concentration mg/L**	
Calcium, Ca	0.06	0.01
Iron, Fe	0.022	0.007
Magnesium, Mg	ND	0.03
Manganese, Mn	ND	0.002
Potassium, K (by AA)	ND	0.01
Sodium, Na	0.09	0.03

Detection limit factor: 1.00

Analysis date (ICP): 01/20/87
Analysis date (K): 01/19/87

ND - not detected at detection limit times factor

AeroVironment
9611-037
min1137a

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000759	000760	000761	000762	999999
Compound			Concentration mg/L		
Calcium, Ca	4.9	8.7	16	16	0.01
Iron, Fe	0.024	0.036	0.032	0.036	0.007
Magnesium, Mg	1.6	3.1	5.4	5.4	0.03
Manganese, Mn	ND	ND	0.003	0.005	0.002
Potassium, K (by AA)	2.3	2	1.1	1.2	0.01
Sodium, Na	46	14	8.6	9.1	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

AeroVironment
8611-037
min1127b

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000763	000764	999999
Compound	Concentration mg/L		
Calcium, Ca	7.3	12	0.01
Iron, Fe	0.19	1	0.007
Magnesium, Mg	3.4	5.4	0.03
Manganese, Mn	0.11	0.15	0.002
Potassium, K (by AA)	1.4	1.9	0.01
Sodium, Na	16	47	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

AD-A194 900 INSTALLATION RESTORATION PROGRAM PHASE 2 CONFIRMATION/QUANTIFICATION STAGE 3(U) AEROVIRONMENT INC MONROVIA CA 05 FEB 88 AV-FR-86/596 7/10

UNCLASSIFIED F33615-83-D-4000 F/G 24/4 NL

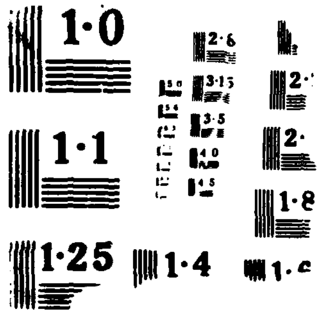
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Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	LAN	LDU	DET
Sample ID#:	999998	000759	999999
Compound	Concentration mg/L		
Calcium, Ca	0.11	5.1	0.01
Iron, Fe	0.01	0.03	0.007
Magnesium, Mg	ND	1.7	0.03
Manganese, Mn	ND	ND	0.002
Potassium, K (by AA)	ND	2.4	0.01
Sodium, Na	0.07	46	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000765	000766	000767	000768	999999
Compound			Concentration mg/L		
Calcium, Ca	11	16	8.9	18	0.01
Iron, Fe	0.31	0.031	0.28	0.072	0.007
Magnesium, Mg	2.2	2.5	5.3	8.8	0.03
Manganese, Mn	ND	ND	0.12	0.1	0.002
Potassium, K (by AA)	1.4	2.2	1.6	1.2	0.01
Sodium, Na	12	12	16	10	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

AeroVironment
8611-040
min1140b

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000769	000770	999999
Compound	Concentration mg/L		
Calcium, Ca	14	14	0.01
Iron, Fe	0.28	0.035	0.007
Magnesium, Mg	0.46	0.45	0.03
Manganese, Mn	ND	ND	0.002
Potassium, K (by AA)	2.5	2.7	0.01
Sodium, Na	24	24	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LDU	LSP	DET
Sample ID#:	999998	000766	000767	999999
Compound	Concentration mg/L			
Calcium, Ca	0.12	16	120 %	0.01
Iron, Fe	0.01	0.024	94 %	0.007
Magnesium, Mg	ND	2.5	92 %	0.03
Manganese, Mn	ND	ND	100 %	0.002
Potassium, K (by AA)	ND	2.2	94 %	0.01
Sodium, Na	0.16	13	100 %	0.03

Detection limit factor:	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor
% - percent spike recovery (spiked at 2 mg/L for Fe and Mn, at 5 mg/L for the rest)

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000771	000772	000773	000774	999999
Compound			Concentration mg/L		
Calcium, Ca	15	0.18	25	7.8	0.01
Iron, Fe	0.062	0.032	0.089	0.042	0.007
Magnesium, Mg	7.4	0.048	13	2	0.03
Manganese, Mn	0.04	ND	0.086	0.011	0.002
Potassium, K (by AA)	1.4	ND	1.6	5	0.01
Sodium, Na	10	0.76	13	31	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	DET
Sample ID#:	000775	000776	000777	999999
Compound		Concentration mg/L		
Calcium, Ca	2.1	13	12	0.01
Iron, Fe	0.13	0.067	0.08	0.007
Magnesium, Mg	0.15	6.5	1.6	0.03
Manganese, Mn	ND	0.05	ND	0.002
Potassium, K (by AA)	3.7	0.96	4.3	0.01
Sodium, Na	33	9	41	0.03

Detection limit factor:	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LDU	DET
Sample ID#:	999998	000777	999999
Compound	Concentration mg/L		
Calcium, Ca	0.12	13	0.01
Iron, Fe	0.015	0.062	0.007
Magnesium, Mg	ND	1.6	0.03
Manganese, Mn	ND	0.01	0.002
Potassium, K (by AA)	ND	4.4	0.01
Sodium, Na	0.12	41	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aerovironment
8611-044
min1144a

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000778	000779	000780	000781	999999
Compound	Concentration mg/L				
Calcium, Ca	11	8.7	9.1	4.7	0.01
Iron, Fe	0.032	0.017	0.045	0.022	0.007
Magnesium, Mg	6.1	3.4	4.3	0.24	0.03
Manganese, Mn	0.05	ND	0.006	ND	0.002
Potassium, K (by AA)	1.4	1.8	1.4	3.4	0.01
Sodium, Na	9.3	17	12	35	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000783	000784	000785	000786	999999
Compound	Concentration mg/L				
Calcium, Ca	9.6	46	31	5.4	0.01
Iron, Fe	0.035	1.4	0.08	0.032	0.007
Magnesium, Mg	1.5	22	15	0.37	0.03
Manganese, Mn	ND	0.55	0.18	ND	0.002
Potassium, K (by AA)	3.5	2.1	1.7	3.1	0.01
Sodium, Na	15	19	15	29	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aerovironment
8611-044
min1144c

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	DET
Sample ID#:	000787	000788	000789	999999
Compound		Concentration mg/L		
Calcium, Ca	25	6.9	100	0.01
Iron, Fe	0.11	0.016	1.5	0.007
Magnesium, Mg	14	1.7	53	0.03
Manganese, Mn	0.098	ND	0.14	0.002
Potassium, K (by AA)	1.9	4.1	2	0.01
Sodium, Na	18	34	28	0.03

Detection limit factor:	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

AeroVironment
8611-044
min1144d

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LDU	LSP	DET
Sample ID#:	999998	000784	000785	999999
Compound		Concentration mg/L		
Calcium, Ca	0.07	45	150 %	0.01
Iron, Fe	ND	1.4	100 %	0.007
Magnesium, Mg	ND	22	94 %	0.03
Manganese, Mn	ND	0.54	100 %	0.002
Potassium, K (by AA)	ND	2.1	92 %	0.01
Sodium, Na	ND	19	120 %	0.03

Detection limit factor:	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor
% - percent spike recovery (spiked at 2.0 mg/L Fe and Mn, at 5.0 mg/L for the rest)

Aerovironment
3611-047
min1147a

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000790	000791	000792	000793	999999
Compound	Concentration mg/L				
Calcium, Ca	5.5	5.5	120	74	0.01
Iron, Fe	0.057	0.034	5.1	3.7	0.007
Magnesium, Mg	1.8	1.8	65	33	0.03
Manganese, Mn	ND	ND	0.17	0.26	0.002
Potassium, K (by AA)	5.1	5.2	2.7	2.1	0.01
Sodium, Na	19	18	29	24	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

AeroVironment
8611-047
min1147b

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000794	000795	999999
Compound	Concentration mg/L		
Calcium, Ca	19	8.9	0.01
Iron, Fe	0.063	0.16	0.007
Magnesium, Mg	2.5	3.9	0.03
Manganese, Mn	ND	0.017	0.002
Potassium, K (by AA)	2.7	0.85	0.01
Sodium, Na	15	8.7	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LDU	DET
Sample ID#:	999998	000794	999999
Compound	Concentration mg/L		
Calcium, Ca	0.14	19	0.01
Iron, Fe	ND	0.041	0.007
Magnesium, Mg	0.04	2.2	0.03
Manganese, Mn	ND	ND	0.002
Potassium, K (by AA)	ND	2.5	0.01
Sodium, Na	0.06	15	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

AeroVironment
8611-050
min1150a

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000796	000797	000798	000799	999999
Compound			Concentration mg/L		
Calcium, Ca	44	75	37	37	0.01
Iron, Fe	0.76	0.026	0.32	0.29	0.007
Magnesium, Mg	25	0.14	17	17	0.03
Manganese, Mn	0.61	ND	0.13	0.13	0.002
Potassium, K (by AA)	3	3.7	1.6	1.4	0.01
Sodium, Na	56	59	15	16	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aerovironment
8611-050
min1150b

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000800	000801	999999
Compound	Concentration mg/L		
Calcium, Ca	23	0.6	0.01
Iron, Fe	0.028	0.022	0.007
Magnesium, Mg	0.16	0.13	0.03
Manganese, Mn	ND	ND	0.002
Potassium, K (by AA)	2.9	0.04	0.01
Sodium, Na	45	0.5	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aerovironment
8611-050
min1150c

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LSP	DET
Sample ID#:	999998	000799	999999
Compound		Concentration mg/L	
Calcium, Ca	0.13	110 %	0.01
Iron, Fe	0.015	99 %	0.007
Magnesium, Mg	ND	73 %	0.03
Manganese, Mn	ND	98 %	0.002
Potassium, K (by AA)	0.02	92 %	0.01
Sodium, Na	0.17	77 %	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor
% - percent spike recovery (spiked at 2.0 mg/L for Fe and Mn, at 5.0 mg/L for the rest

Aerovironment
3612-014
min1214a

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000601	000602	000603	000604	999999
Compound			Concentration mg/L		
Calcium, Ca	8.9	9.7	14	18	0.01
Iron, Fe	0.024	0.018	0.044	0.099	0.007
Magnesium, Mg	5.3	0.27	7.7	9.4	0.02
Manganese, Mn	0.12	ND	0.007	0.091	0.002
Potassium, K (by AA)	1.7	3.4	1.7	1.3	0.01
Sodium, Na	14	16	11	11	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	DET
Sample ID#:	999998	999999
Compound	Concentration mg/L	
Calcium, Ca	0.1	0.01
Iron, Fe	0.012	0.007
Magnesium, Mg	ND	0.03
Manganese, Mn	ND	0.002
Potassium, K (by AA)	ND	0.01
Sodium, Na	ND	0.03

Detection limit factor: 1.00

Analysis date (ICP): 01/20/87
Analysis date (K): 01/19/87

ND - not detected at detection limit times factor

AeroVironment
8612-215
min1215a

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000605	000606	000607	000608	999999
Compound			Concentration mg/L		
Calcium, Ca	7.5	12	21	20	0.01
Iron, Fe	0.066	0.032	0.14	0.14	0.007
Magnesium, Mg	0.33	1.1	11	11	0.03
Manganese, Mn	ND	ND	0.062	0.061	0.002
Potassium, K (by AA)	3	3.7	1.6	1.4	0.01
Sodium, Na	21	26	12	13	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000609	000610	000611	000612	999999
Compound	Concentration mg/L				
Calcium, Ca	9.8	37	5.5	8.6	0.01
Iron, Fe	0.016	0.057	0.033	0.02	0.007
Magnesium, Mg	2.1	16	1.1	3.5	0.03
Manganese, Mn	0.003	0.033	ND	ND	0.002
Potassium, K (by AA)	4.2	2	3.2	1.8	0.01
Sodium, Na	22	15	17	9.2	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

HercEnvironment
8612-015
ain12150

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000613	000614	999999
Compound	Concentration mg/L		
Calcium, Ca	6.3	83	0.01
Iron, Fe	0.057	1.2	0.007
Magnesium, Mg	0.77	43	0.03
Manganese, Mn	ND	0.36	0.002
Potassium, K (by AA)	3.4	2.3	0.01
Sodium, Na	15	22	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aerovironment
8612-015
min1215d

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LDU	DET
Sample ID#:	999998	000607	999999
Compound	Concentration mg/L		
Calcium, Ca	0.13	21	0.01
Iron, Fe	0.012	0.15	0.007
Magnesium, Mg	ND	11	0.03
Manganese, Mn	ND	0.064	0.002
Potassium, K (by AA)	ND	1.6	0.01
Sodium, Na	0.06	12	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

AeroVironment
8612-019
min1219a

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000615	000616	000617	000618	999999
Compound			Concentration mg/L		
Calcium, Ca	7.7	12	12	3.3	[illegible]
Iron, Fe	0.024	0.042	0.078	0.12	[illegible]
Magnesium, Mg	3.6	6.4	6.4	0.42	[illegible]
Manganese, Mn	0.026	0.012	0.024	ND	0.002
Potassium, K (by AA)	2	0.76	1.4	3.4	0.01
Sodium, Na	8.9	8.7	8.6	18	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aerovironment
8612-019
min1219b

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000619	000620	000621	000622	999999
Compound			Concentration mg/L		
Calcium, Ca	8	3.7	13	7.5	0.01
Iron, Fe	0.26	0.051	0.095	0.02	0.007
Magnesium, Mg	4.4	0.32	6.1	4	0.03
Manganese, Mn	0.11	ND	0.13	ND	0.002
Potassium, K (by AA)	0.76	3.7	2.9	0.97	0.01
Sodium, Na	18	15	9.2	7.4	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aero.incontent
8612-019
min1219c

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000623	000624	000625	000626	999999
Compound		Concentration mg/L			
Calcium, Ca	11	20	8.6	12	[illegible]
Iron, Fe	0.11	0.35	0.018	0.052	[illegible]
Magnesium, Mg	5.1	9.8	3.9	4.9	[illegible]
Manganese, Mn	0.11	0.16	ND	0.081	[illegible]
Potassium, K (by AA)	1.7	3.8	1.9	3	[illegible]
Sodium, Na	15	11	6.8	13	[illegible]

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000627	000628	999999
Compound	Concentration mg/L		
Calcium, Ca	12	18	0.01
Iron, Fe	0.086	0.3	0.007
Magnesium, Mg	5.8	9.4	0.03
Manganese, Mn	0.12	0.25	0.002
Potassium, K (by AA)	2.3	3.4	0.01
Sodium, Na	10	11	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aerovironment
8512-019
min1219e

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LDU	LSP	DET
Sample ID#:	999998	000618	000621	999999
Compound	Concentration mg/L			
Calcium, Ca	0.08	3.4	110 %	0.01
Iron, Fe	0.012	0.15	110 %	0.007
Magnesium, Mg	ND	0.43	100 %	0.03
Manganese, Mn	ND	ND	110 %	0.002
Potassium, K (by AA)	ND	3.5	97 %	0.01
Sodium, Na	ND	19	110 %	0.03

Detection limit factor:	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor
% - percent spike recovery (spiked at 2.0 mg/L Fe and Mn, at 5.0 mg/L for the rest)

AeroVironment
8612-020
ain1220a

Table 1.   Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000629	000630	000631	000632	999999
Compound			Concentration mg/L		
Calcium, Ca	8.7	8.2	120	44	0.01
Iron, Fe	0.023	0.015	9.4	1.5	07
Magnesium, Mg	3.1	2.9	51	24	03
Manganese, Mn	ND	ND	0.18	0.37	0.002
Potassium, K (by AA)	3	2.7	2	4.1	0.01
Sodium, Na	19	19	29	31	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000633	000634	000635	000636	999999
Compound	**Concentration mg/L**				
Calcium, Ca	13	20	10	0.29	0.01
Iron, Fe	0.05	0.074	0.017	0.018	0.007
Magnesium, Mg	0.26	9.2	0.08	0.05	0.03
Manganese, Mn	ND	0.047	ND	ND	0.002
Potassium, k (by AA)	3.6	1.3	3.1	0.02	0.01
Sodium, Na	27	11	25	0.69	0.03
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87	
Analysis date (k):	01/19/87	01/19/87	01/19/87	01/19/87	

ND - not detected at detection limit times factor

Aerovironment
8612-020
min1220c

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000637	000638	999999
Compound	Concentration mg/L		
Calcium, Ca	140	5.1	0.01
Iron, Fe	6.3	0.17	0.007
Magnesium, Mg	58	1.8	0.03
Manganese, Mn	0.19	ND	0.002
Potassium, K (by AA)	2.4	4.2	0.01
Sodium, Na	28	15	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

[illegible]
8612-02
min122.d

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LDU	LSP	DET
Sample ID#:	999998	000633	000634	999999
Compound		Concentration mg/L		
Calcium, Ca	0.17	14	140 %	0.01
Iron, Fe	0.012	0.036	110 %	0.007
Magnesium, Mg	ND	0.18	110 %	0.03
Manganese, Mn	ND	ND	110 %	0.002
Potassium, K (by AA)	ND	3.7	100 %	0.01
Sodium, Na	ND	28	120 %	0.03

Detection limit factor:	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor
% - percent spike recovery (spiked at 2.0 mg/L for Fe and Mn, at 5.0 mg/L for the rest

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000639	000640	000641	000642	999999
Compound	Concentration mg/L				
Calcium, Ca	68	43	45	9.8	0.01
Iron, Fe	11	0.18	0.17	0.92	0.007
Magnesium, Mg	33	23	24	3.5	0.03
Manganese, Mn	0.21	0.093	0.097	0.005	0.002
Potassium, K (by AA)	1.9	1.7	1.8	2.9	0.01
Sodium, Na	23	18	18	10	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000643	000644	000645	000646	999999
Compound	Concentration mg/L				
Calcium, Ca	7.3	12	7.7	7.1	0.01
Iron, Fe	0.19	0.075	0.02	0.055	0.007
Magnesium, Mg	2.6	4.7	3.3	2.7	0.03
Manganese, Mn	ND	0.014	ND	ND	0.002
Potassium, K (by AA)	5.4	1.9	2.3	2.1	0.01
Sodium, Na	20	14	10	11	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000647	000648	999999
Compound	Concentration mg/L		
Calcium, Ca	9.1	34	0.01
Iron, Fe	0.14	0.35	0.007
Magnesium, Mg	4.1	16	0.03
Manganese, Mn	ND	ND	0.002
Potassium, K (by AA)	1	1.6	0.01
Sodium, Na	7.6	15	0.03

Detection limit factor:	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

ND - not detected at detection limit times factor

AeroVironment
3612-022
min12223

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LDU	LDU	DET
Sample ID#:	999998	000640	000648	999999
Compound		Concentration mg/L		
Calcium, Ca	0.1	44	33	0.01
Iron, Fe	0.009	0.18	0.35	0.007
Magnesium, Mg	ND	23	15	0.03
Manganese, Mn	ND	0.092	ND	0.002
Potassium, K (by AA)	ND	1.8	1.5	0.01
Sodium, Na	0.1	18	15	0.03

Detection limit factor:	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aerovironment
8612-023
min1223a

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000649	000650	000651	000652	999999
Compound			Concentration mg/L		
Calcium, Ca	10	3.4	7.6	7.5	0.01
Iron, Fe	0.035	0.098	0.033	0.17	0.007
Magnesium, Mg	4.3	0.72	3.5	3.5	0.03
Manganese, Mn	0.009	ND	0.13	0.12	0.002
Potassium, K (by AA)	2.9	4.2	1.5	1.4	0.01
Sodium, Na	12	27	13	14	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Aerovironment
8612-023
a:m1223b

Table 1.   Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000653	000654	000655	000656	999999
Compound			Concentration mg/L		
Calcium, Ca	11	10	8	16	0.01
Iron, Fe	0.018	0.079	0.47	0.22	0.007
Magnesium, Mg	4.8	2.9	3.1	5.4	0.03
Manganese, Mn	0.013	ND	ND	ND	0.002
Potassium, K (by AA)	5.4	1.9	2.3	2.1	0.01
Sodium, Na	11	11	8.7	9.1	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

AeroVironment
8612-020
min1223c

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000657	000658	000659	000660	999999
Compound			Concentration mg/L		
Calcium, Ca	7.1	13	14	0.19	0.01
Iron, Fe	0.062	0.02	0.04	0.022	0.007
Magnesium, Mg	2.8	5.6	5.5	ND	0.03
Manganese, Mn	0.003	0.13	0.12	ND	0.002
Potassium, K (by AA)	3.4	1.7	1.5	ND	0.01
Sodium, Na	16	30	30	0.75	0.03

Detection limit factor:	1.00	1.00	1.00	1.00
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87	01/19/87

ND - not detected at detection limit times factor

Table 1. Analysis Type: 200.7 Mineral Results

Sample Type:	LAN	DET
Sample ID#:	000661	999999
Compound	Concentration mg/L	
Calcium, Ca	9.8	0.01
Iron, Fe	0.16	0.007
Magnesium, Mg	3.4	0.03
Manganese, Mn	0.55	0.002
Potassium, K (by AA)	0.94	0.01
Sodium, Na	9.9	0.03

Detection limit factor: 1.00

Analysis date (ICP): 01/21/87
Analysis date (K): 01/19/87

ND - not detected at detection limit times factor

AeroVironment
8612-023
min1223e

Table 2. Analysis Type: 200.7 Mineral QA

Sample Type:	MB1	LDU	LSP	DET
Sample ID#:	999998	000650	000656	999999
Compound		Concentration mg/L		
Calcium, Ca	0.2	3.4	110 %	0.01
Iron, Fe	0.015	0.06	110 %	0.007
Magnesium, Mg	ND	0.67	90 %	0.03
Manganese, Mn	ND	ND	100 %	0.002
Potassium, K (by AA)	ND	4.2	95 %	0.01
Sodium, Na	0.16	28	96 %	0.03
Detection limit factor:	1.00	1.00	1.00	
Analysis date (ICP):	01/21/87	01/21/87	01/21/87	
Analysis date (K):	01/19/87	01/19/87	01/19/87	

ND - not detected at detection limit times factor
% - percent spike recovery (spiked at 2.0 mg/L for Fe and Mn, at 5.0 mg/L for the rest

ACUREX Corporation

Energy & Environmental Division

November 26, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed for bicarbonate, carbonate, and hydroxide alkalinities by Standard Method 403. The results are presented in Table 1 with QA results in Table 2.

Prepared by: June Romeo Maramba Milanes
Chemist

Approved by: Greg Nicoll
Manager, Inorganic Chemistry

485 Clyde Avenue, PO Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex 325961 FAX (415) 964-5145

[illegible]
Mather AFB
November 1986

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000751	000752	000753	000754	999999
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	47	57	58	43	[illegible]
Carbonate Alk., as CaCO3	ND	ND	ND	ND	4
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000755	000756	000757	000753	999999
Compound	Concentration, mg/L				
Bicarbonate Alk., as $CaCO_3$	34	51	79	26	1
Carbonate Alk., as $CaCO_3$	ND	ND	ND	ND	1
Hydroxide Alk., as $CaCO_3$	ND	ND	ND	ND	1
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	[illegible]
Sample ID#:	000759	[illegible]	000761	000762	[illegible]
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	81	45	69	71	[illegible]
Carbonate Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

[illegible]
Matter [illegible]
November [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000763	000764	000765	000766	999999
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	49	120	60	51	[illegible]
Carbonate Alk., as CaCO3	ND	ND	4	22	4
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

[illegible]
Mather [illegible]
November [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000757	000758	000759	000[illegible]	[illegible]
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	56	77	99	5[illegible]	[illegible]
Carbonate Alk., as CaCO3	ND	ND	ND	22	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

[illegible]
Matter [illegible]
November [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	[illegible]
Sample ID#:	000771	000772	000773	000774	[illegible]
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	[illegible]	4	[illegible]	56	[illegible]
Carbonate Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

[illegible]
Mather AFB
November 1986

Table 1.   Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000775	000776	000777	000778	000000
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	39	49	5[illegible]	62	1
Carbonate Alk., as CaCO3	18	ND	42	ND	4
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis Date:	11/21/86	11/21/86	11/21/86	11/21/86	

Hard [illegible]
Water [illegible]
November [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000779	000780	000781	000782	[illegible]
Compound	Concentration, mg/L				
Bicarbonate Alk., as CaCO3	50	1[illegible]0	[illegible]4	45	1
Carbonate Alk., as CaCO3	ND	ND	5	18	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

[illegible]
Matter [illegible]
November [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000784	000785	000786	000787	######
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	240	170	51	110	1
Carbonate Alk., as CaCO3	ND	ND	6	ND	1
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

[illegible]
Matter [illegible]
November [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000788	000789	000790	000791	999999
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	49	350	60	[illegible]	[illegible]
Carbonate Alk., as CaCO3	ND	ND	8	8	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000792	000793	000794	000795	999999
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	450	310	94	51	1
Carbonate Alk., as CaCO3	ND	ND	22	ND	4
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

[illegible]
Matter [illegible]
November [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000796	000797	000798	000799	999999
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	55	240	150	150	[illegible]
Carbonate Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000800	000801	999999
Compound	Concentration, mg/L		
Bicarbonate Alk., as CaCO3	ND	4	2
Carbonate Alk., as CaCO3	60	ND	4
Hydroxide Alk., as CaCO3	34	ND	2
Analysis date:	11/21/86	11/21/86	

Table 2. Analysis Type: Alkalinity QA

Sample Type:	MB1	MB2	LDU	LDU	DET
Sample ID#:	999999	999998	000764	00077[illegible]	999999
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	ND	ND	120	59	2
Carbonate Alk., as CaCO3	ND	ND	ND	22	4
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	2
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

Table 2. Analysis Type: Alkalinity QA

Sample Type:	LDU	LDU	LDU	LSP	DET
Sample ID#:	000776	000784	000799	000770	999999
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	51	250	150	103 %	2
Carbonate Alk., as CaCO3	ND	ND	ND	NS	4
Hydroxide Alk., as CaCO3	ND	ND	ND	NS	2
Analysis date:	11/21/86	11/21/86	11/21/86	11/21/86	

% - percent spike recovery (spiked at 500 mg/L)
NS - not spiked

Table 2. Analysis Type: Alkalinity QA

Sample Type:	LSP	LSP	DET
Sample ID#:	000784	000798	999999
Compound	**Concentration, mg/L**		
Bicarbonate Alk., as CaCO3	110 %	103 %	2
Carbonate Alk., as CaCO3	NS	NS	4
Hydroxide Alk., as CaCO3	NS	NS	2
Analysis date:	11/21/86	11/21/86	

% - percent spike recovery (spiked at 500 mg/L)
NS - not spiked

ACUREX Corporation

DEC .. 1986

Energy & Environmental Division

December 22, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed for bicarbonate, carbonate, and hydroxide alkalinities by Standard Method 403. The results are presented in Table 1 with QA results in Table 2.

Prepared by: J. Romeo M. Milanes
Chemist

Approved by: Greg Nicoll
Manager, Inorganic Chemistry

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Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	Concentration, mg/L				
Bicarbonate Alk., as CaCO3	51	42	76	68	1
Carbonate Alk., as CaCO3	ND	ND	ND	ND	1
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis date:	12/09/86	12/09/86	12/09/86	12/09/86	

ND = not detected at detection limit

[illegible]
Mather AF[illegible]
December [illegible]

Table [illegible]. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000605	000606	000607	000608	999999
Compound	Concentration, mg/L				
Bicarbonate Alk., as CaCO3	59	65	59	1[illegible]	1
Carbonate Alk., as CaCO3	8	ND	ND	ND	1
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis date:	12/15/86	12/15/86	12/15/86	12/15/86	

ND - not detected at detection limit

Lab Name: [illegible]
Number: [illegible]
December [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	GRN	GRN	GRN	GRN	DET
Sample ID#:	000509	000510	000511	000512	999999
Compound	**Concentration, mg/L**				
Bicarbonate Alk., as CaCO3	94	170	52	59	1
Carbonate Alk., as CaCO3	ND	ND	ND	ND	1
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis date:	12/16/85	12/16/85	12/16/85	12/16/85	

ND = not detected at detection limit

Table 1. Analysis Type: Alkalinity Results

Sample Type: Sample ID#:	LAN 000513	LAN 000514	LAN 000515	LAN 000516	DET [illegible]
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	40	250	50	49	[illegible]
Carbonate Alk., as CaCO3	12	ND	ND	ND	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	12/16/86	12/16/86	12/16/86	12/16/86	

ND - not detected at detection limit

Revision [illegible]
Number [illegible]
December [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Site:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000517	000518	000519	000520	[illegible]
Compound	**Concentration, mg/L**				
Bicarbonate Alk., as CaCO3	57	78	60	76	
Carbonate Alk., as CaCO3	ND	10	ND	ND	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	12/15/86	12/15/86	12/15/86	12/17/86	

ND = not detected at detection limit

Report ...
Number ...
December ...

Table 1. Analysis Type: Alkalinity Results

Sample Type: / Sample ID#: / Compound	CAN 000521	CAN 000522	CAN 000523	CAN 000524	DET [illegible]
	Concentration, mg/L				
Bicarbonate Alk., as CaCO3	38	41	76	[illegible]	-
Carbonate Alk., as CaCO3	ND	ND	ND	ND	-
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	-
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND - not detected at detection limit

[illegible]
Matter [illegible]
[illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Loc:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000625	[illegible]	[illegible]	[illegible]	[illegible]
Compound	**Concentration, mg/L**				
Bicarbonate Alk., as CaCO3	42	[illegible]	[illegible]	[illegible]	[illegible]
Carbonate Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND = not detected at detection limit

[illegible]
Matrix: [illegible]
[illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	[illegible]
Sample ID#:	000629	000630	[illegible]	[illegible]	[illegible]
Compound	Concentration, mg/L				
Bicarbonate Alk., as CaCO3	57	59	74	11	-
Carbonate Alk., as CaCO3	ND	ND	ND	ND	-
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	-
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND = not detected at detection limit

Table 1. Analysis Type: Alkalinity Results

Sample ID:	LAN	LAN	LAN	LAN	DET
Sample Lab #:	[illegible]5??	[illegible]574	[illegible]5??	[illegible]	[illegible]
Compound			Concentration, mg/L		
Bicarbonate Alk., as CaCO3	47	55	29	ND	1
Carbonate Alk., as CaCO3	ND	ND	26	ND	1
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	
Analysis date:	12/17/85	12/17/85	12/17/85	12/17/85	

ND = not detected at detection limit

[illegible]
[illegible]
[illegible]

Table .. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	[illegible]
Sample ID#:	000637	000638	000639	000640	[illegible]
Compound	Concentration, mg/L				
Bicarbonate Alk., as CaCO3	440	43	380	22[illegible]	[illegible]
Carbonate Alk., as CaCO3	ND	12	ND	ND	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND - not detected at detection limit

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000641	000642	000643	000644	[illegible]
Compound			Concentration, mg/L		
Bicarbonate Alk., as CaCO3	750	39	58	59	[illegible]
Carbonate Alk., as CaCO3	ND	12	ND	10	-
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	-
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND - not detected at detection limit

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	LET
Sample ID#:	000645	000646	000647	000648	[illegible]
Compound	Concentration, mg/L				
Bicarbonate Alk., as CaCO3	47	47	47	140	[illegible]
Carbonate Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Analysis date:	12/17/85	12/17/85	12/17/85	12/17/85	

ND = not detected at detection limit

[illegible]
Matrix: [illegible]
December [illegible]

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000649	000650	000651	000652	######
Compound		Concentration, mg/L			
Bicarbonate Alk., as $CaCO_3$	110	50	49	47	-
Carbonate Alk., as $CaCO_3$	ND	15	ND	ND	-
Hydroxide Alk., as $CaCO_3$	ND	ND	ND	ND	-
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND - not detected at detection limit

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000653	000654	000655	000656	999999
Compound	Concentration, mg/L				
Bicarbonate Alk., as CaCO3	59	51	49	54	1
Carbonate Alk., as CaCO3	ND	ND	ND	ND	1
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND - not detected at detection limit

Table 1. Analysis Type: Alkalinity Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000657	000658	000659	000660	999999
Compound		Concentration, mg/L			
Bicarbonate Alk., as CaCO3	55	140	140	ND	1
Carbonate Alk., as CaCO3	ND	ND	ND	ND	[illegible]
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND - not detected at detection limit

Table 1 Analysis Total Alkalinity Results

Sample Site:	[illegible]AN	DET
Sample ID#:	[illegible]1	999999
Compound	Concentration, mg/L	
Bicarbonate Alk., as $CaCO_3$	47	2
Carbonate Alk., as $CaCO_3$	ND	4
Hydroxide Alk., as $CaCO_3$	ND	0

Analysis Date: 12 17 86

ND = not detected at detection limit

Table [illegible]. Analysis Type: Alkalinity [illegible]

Sample Type:	MB1	MB2	MB3	LDU	DET
Sample ID#:	999993	999998	999993	000611	[illegible]
Compound			Concentration, mg/L		
Bicarbonate Alk., as CaCO3	ND	ND	ND	52	1
Carbonate Alk., as CaCO3	ND	ND	ND	ND	4
Hydroxide Alk., as CaCO3	ND	ND	ND	ND	1
Analysis date:	12/09/86	12/16/86	12/17/86	12/16/86	

ND - not detected at detection limit

Table 2. Analysis Type: Alkalinity QA

Sample Type:	LDU	LDU	LDU	LDU	CET
Sample ID#:	000622	000630	000645	000647	999999
Compound		Concentration, mg/L			
Bicarbonate Alk., as $CaCO_3$	81	57	49	45	2
Carbonate Alk., as $CaCO_3$	ND	ND	ND	ND	4
Hydroxide Alk., as $CaCO_3$	ND	ND	ND	ND	0
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND - not detected at detection limit

[illegible]
[illegible]
December [illegible]

Table [illegible]. Analysis Type: Alkalinity QA

Sample Type:	LDC	LSP	LSP	LSP	[illegible]
Sample ID#:	[illegible]57	[illegible]625	000636	000656	[illegible]
Compound:	Concentration, mg/L				
Bicarbonate Alk., as CaCO3	55	103 %	101 %	[illegible] %	[illegible]
Carbonate Alk., as CaCO3	ND	NS	NS	NS	[illegible]
Hydroxide Alk., as CaCO3	ND	NS	NS	NS	[illegible]
Analysis date:	12/17/86	12/17/86	12/17/86	12/17/86	

ND - not detected at detection limit
NS - not spiked
% - spike sample recovery (spiked at 500 mg/L)

DEC 2 2 1986

CORN

ACUREX Corporation

Energy & Environmental Division

NOVEMBER 22, 1986

AEROVIRONMENT, INC.
825 MYRTLE AVENUE
MONROVIA, CA 91016

ATTENTION: CHRIS LOVDAHL

SUBJECT: ANALYSIS OF MATHER AIR FORCE BASE SAMPLES

SAMPLES WERE ANALYZED FOR BROMIDE, CHLORIDE, FLUORIDE, NITRATE, NITRITE, PHOSPHATE, AND SULFATE ANIONS USING STANDARD METHOD 429 (ION CHROMATOGRAPHY). THE RESULTS ARE PRESENTED IN TABLE 1 WITH QA RESULTS IN TABLE 2.

PREPARED BY: J. Romeo Milanes
J. ROMEO MILANES
CHEMIST

APPROVED BY: Greg Nicoll
GREG NICOLL
MANAGER, INORGANIC CHEMISTRY

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000751	000752	000753	000754	999999
Compound		Concentration mg/L			
Bromide	0.2	0.4	0.2	ND	0.1
Chloride	3.8	5.9	3	7.7	0.1
Fluoride	0.2	0.3	0.2	0.5	0.1
Nitrate, as N	3.2	3.6	2.2	0.3	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	2.5	6.7	1.7	5.7	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/12/86	11/12/86	11/12/86	11/12/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000755	000756	000757	000758	999999
Compound	Concentration mg/L				
Bromide	0.1	0.1	0.1	0.1	0.1
Chloride	7.4	3.2	13	4.4	0.1
Fluoride	0.7	0.2	0.8	0.5	0.1
Nitrate, as N	0.2	3.3	0.2	3.9	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	16	3.5	26	3.2	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/12/86	11/12/86	11/12/86	11/12/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000759	000760	000761	000762	999999
Compound	Concentration mg/L				
Bromide	0.1	ND	0.1	0.1	0.1
Chloride	18	5.6	3.3	3.2	0.1
Fluoride	0.6	0.3	0.2	0.2	0.1
Nitrate, as N	0.2	0.4	2.3	2.3	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	28	9.1	4	3.9	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/13/86	11/13/86	11/13/86	11/13/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000763	000764	000765	000766	999999
Compound	Concentration mg/L				
Bromide	0.1	0.1	ND	ND	0.1
Chloride	3.6	8.5	2.4	5	0.1
Fluoride	0.3	0.3	0.2	ND	0.1
Nitrate, as N	2.9	1.9	0.4	2.4	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	3.7	29	6.8	5.1	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/13/86	11/13/86	11/14/86	11/14/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000767	000768	000769	000770	999999
Compound	Concentration mg/L				
Bromide	ND	ND	ND	ND	0.1
Chloride	6	21 z	2.5	2.4	0.1
Fluoride	0.2	ND	0.1	0.1	0.1
Nitrate, as N	2.6	0.5	1.1	1.1	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	6.7	5.5	6.1	6.1	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/14/86	11/14/86	11/14/86	11/14/86	

ND - not detected at detection limit times factor
z - analyzed on 11/19/86

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000771	000772	000773	000774	999999
Compound			Concentration mg/L		
Bromide	0.2	ND	0.1	ND	0.1
Chloride	12	ND	7.4	24	0.1
Fluoride	ND	ND	0.1	0.3	0.1
Nitrate, as N	0.6	ND	4.4	ND	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	3.9	ND	6.2	38	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/16/86	11/16/86	11/16/86	11/16/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN *	LAN	LAN	LAN	DET
Sample ID#:	000775	000776	000777	000778	999999
Compound		Concentration mg/L			
Bromide	0.1	0.2	ND	0.1	0.1
Chloride	6.4	11	7.8	4.9	0.1
Fluoride	0.5	0.1	0.3	0.1	0.1
Nitrate, as N	ND	3.5	0.1	2.6	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	29	3.3	38	6.8	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/17/86	11/16/86	11/16/86	11/17/86	

ND - not detected at detection limit times factor
Note: Sample 000775 received on 11/17/86

* Data for nitrate/nitrite invalid, holding time exceeded

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000779	000780	000781	000783	999999
Compound		Concentration mg/L			
Bromide	0.1	ND	ND	ND	0.1
Chloride	7.3	3.7	8.9	3.3	0.1
Fluoride	0.2	0.2	0.4	0.2	0.1
Nitrate, as N	0.5	0.6	0.2	0.9	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	15	12	49	3.7	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/17/86	11/17/86	11/17/86	11/17/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN *	LAN	LAN	LAN	DET
Sample ID#:	000784	000785	000786	000787	999999
Compound		Concentration mg/L			
Bromide	0.2	0.2	0.1	0.3	0.1
Chloride	22	12	11	14	0.1
Fluoride	0.2	0.1	0.3	ND	0.1
Nitrate, as N	0.3	2.6	0.3	0.4	0.1
Nitrite, as N	ND	ND	0.2	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	5.8	8.9	19	48	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/18/86	11/17/86	11/17/86	11/17/86	

ND - not detected at detection limit times factor

* Data for nitrate/nitrite invalid,
holding time exceeded

AeroVironment
Mather AFB
November 1986

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000788	000789	000790	000791	999999
Compound	Concentration mg/L				
Bromide	0.2	0.2	0.1	0.1	0.1
Chloride	24	19	3.8	4	0.1
Fluoride	0.3	ND	0.2	0.2	0.1
Nitrate, as N	ND	5.8	1.3	1.4	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	28	200	2.4	2.5	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/17/86	11/17/86	11/18/86	11/18/86	

ND - not detected at detection limit times factor

AeroVironment
Mather AFB
November 1986

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000792	000793	000794	000795	999999
Compound			Concentration mg/L		
Bromide	0.6	0.3	ND	ND	0.1
Chloride	22	29	3.8	3.7	0.1
Fluoride	ND	ND	ND	0.1	0.1
Nitrate, as N	0.6	5.8	0.8	2.7	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	260	10	6	2	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/18/86	11/18/86	11/18/86	11/18/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN *	LAN *	DET
Sample ID#:	000796	000797	000798	000799	999999
Compound	Concentration mg/L				
Bromide	0.3	0.1	0.6 q	0.6 q	0.1
Chloride	24	7.4	7.4 q	7.9 q	0.1
Fluoride	0.3	0.5	ND q	0.2 q	0.1
Nitrate, as N	0.7	1	1.4 q	1.5 q	0.1
Nitrite, as N	ND	1	ND q	ND q	0.1
Phosphate, as P	ND	ND	ND q	ND q	0.1
Sulfate	100	39	46 q	47 q	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/19/86	11/19/86	11/21/86	11/21/86	

ND - not detected at detection limit times factor
q - Sample originally ran on 11/19/86 on nitric acid preserved aliquot due to laboratory error.

* Data for nitrate/nitrite invalid, holding time exceeded

Table 1. Analysis Type: 429 Results

Sample Type:	LAN *	LAN	DET
Sample ID#:	000800	000801	999999
Compound	**Concentration mg/L**		
Bromide	0.1 q	ND	0.1
Chloride	6.8 q	ND	0.1
Fluoride	0.5 q	ND	0.1
Nitrate, as N	0.2 q	ND	0.1
Nitrite, as N	1.1 q	ND	0.1
Phosphate, as P	ND q	ND	0.1
Sulfate	65 q	ND	0.1
Detection limit factor:	1.00	1.00	
Analysis date:	11/21/86	11/19/86	

ND - not detected at detection limit times factor
q - Sample originally ran on 11/19/86 on nitric acid preserved aliquot
due to laboratory error.

* Data for nitrate/nitrite invalid,
holding time exceeded

AeroVironment
Mather AFB
November 1986

Table 2. Analysis Type: 429 QA

Sample Type:	MB1	MB2	LDU	LDU	DET
Sample ID#:	999998	999998	000760	000770	999999
Compound			Concentration mg/L		
Bromide	ND	ND	ND	ND	0.1
Chloride	ND	ND	5.6	2.5	0.1
Fluoride	ND	ND	0.3	0.1	0.1
Nitrate, as N	ND	ND	0.4	1.1	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	ND	ND	9	6.1	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/12/86	11/15/86	11/13/86	11/14/86	

ND - not detected at detection limit times factor

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Table 2. Analysis Type: 4

Sample Type:	LDU	LDU	LDU	LDU	DET
Sample ID#:	000771	000778	000801	000770	999999
Compound			Concentration mg/L		
Bromide	0.1	0.1	ND	ND	0.1
Chloride	11	4.7	ND	2.5	0.1
Fluoride	ND	0.1	ND	0.1	0.1
Nitrate, as N	0.6	2.6	ND	1.1	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	3.9	6.7	ND	6.1	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/15/86	11/17/86	11/19/86	11/14/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 429 QA

Sample Type:	LSP	LSP	LSP	LSP	DET
Sample ID#:	000765	000778	000797	999997	999999
Compound			Concentration mg/L		
Bromide	92 %	88 %	98 %	NS	0.1
Chloride	90 %	89 %	97 %	96 *	0.1
Fluoride	85 %	82 %	91 %	110 *	0.1
Nitrate, as N	91 %	90 %	100 %	90 *	0.1
Nitrite, as N	89 %	89 %	95 %	NS	0.1
Phosphate, as P	90 %	87 %	84 %	89 *	0.1
Sulfate	95 %	95 %	100 %	98 *	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/14/86	11/17/86	11/19/86	11/20/86	

ND - not detected at detection limit times factor
NS - not spiked
% - percent recovery (spiked at 1.0 mg/L)
* - percent recovery of Quality Control sample 9903

Table 2. Analysis Type: 429 QA

Sample Type:	MB3	DET
Sample ID#:	999998	999999
Compound	Concentration mg/L	
Bromide	ND	0.1
Chloride	ND	0.1
Fluoride	ND	0.1
Nitrate, as N	ND	0.1
Nitrite, as N	ND	0.1
Phosphate, as P	ND	0.1
Sulfate	ND	0.1

Detection limit factor: 1.00

Analysis date: 11/21/86

ND - not detected at detection limit times factor

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CONFIRMATION/QUANTIFICATION STAGE 3(U) AEROVIRONMENT
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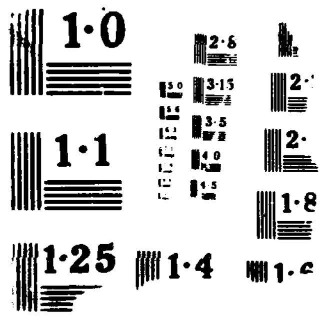
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ACUREX Corporation

DEC .. 1986

Energy & Environmental Division

December 18, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed by ion chromatography for bromide, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate anions using Standard method 429. The results are presented in Table 1 with QA results in Table 2.

Prepared by: J. Romeo M. Milanes, Chemist

Approved by: Greg Nicoll, Manager, Inorganic Chemistry

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000601	000602	000603	000604	[illegible]
Compound	Concentration mg/L				
Bromide	ND	ND	0.2	0.2	0.1
Chloride	5.8	5.2	10	22	0.1
Fluoride	0.2	ND	ND	ND	0.1
Nitrate, as N	2.9	1.9	0.6	0.5	0.1
Nitrite, as N	ND	0.3	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	7	7.5	5	7.9	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/09/86	12/09/86	12/09/86	12/09/86	

ND - not detected at detection limit times factor

[illegible]
Mather AFB
December [illegible]

Table 1.   Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000605	000606	000607	000608	[illegible]
Compound	Concentration mg/L				
Bromide	ND	0.3	0.2	0.2	[illegible]
Chloride	2.5	3.6	5.7	6.3	[illegible]
Fluoride	ND	ND	ND	ND	[illegible]
Nitrate, as N	1	0.3	4	4	[illegible]
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	[illegible]
Sulfate	3.8	29	5.3	6.2	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/10/86	12/10/86	12/10/86	12/10/86	

ND - not detected at detection limit times factor

Aerovironment
Mather AFB
December 1986

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000609	000610	000611	000612	999999
Compound	Concentration mg/L				
Bromide	0.3	0.2	0.3	0.4	0.1
Chloride	10	14	6.5	3.9	0.1
Fluoride	0.2	ND	0.2	0.2	0.1
Nitrate, as N	ND	3.2	ND	ND	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	16	9.6	3.9	2	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/10/86	12/10/86	12/10/86	12/10/86	

ND = not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000613	000614	000615	000616	999999
Compound	**Concentration mg/L**				
Bromide	0.5	0.4	0.2	0.2	0.1
Chloride	3.6	16	2.8	11	0.1
Fluoride	ND	ND	0.2	ND	0.1
Nitrate, as N	ND	1.1	1.4	3.5	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	6	180	2.4	3.2	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/10/86	12/10/86	12/11/86	12/11/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000517	000518	000519	[illegible]	[illegible]
Compound			Concentration mg/L		
Bromide	ND	[illegible]	ND	[illegible]	[illegible]
Chloride	4.6	[illegible]	[illegible]	[illegible]	[illegible]
Fluoride	ND	[illegible]	[illegible]	ND	[illegible]
Nitrate, as N	[illegible]	ND	[illegible]	[illegible]	[illegible]
Nitrite, as N	ND	ND	ND	ND	[illegible]
Phosphate, as P	ND	ND	ND	ND	[illegible]
Sulfate	5.8	[illegible]	12	[illegible]	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/11/86	12/11/86	12/11/86	12/11/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000621	000622	000623	000624	999999
Compound			Concentration mg/L		
Bromide	ND	ND	ND	ND	.1
Chloride	8.1	2.3	5.5	6.7	.1
Fluoride	ND	ND	ND	ND	[illegible]
Nitrate, as N	ND	1.7	ND	ND	.1
Nitrite, as N	ND	ND	ND	ND	.1
Phosphate, as P	ND	ND	ND	ND	.1
Sulfate	ND	1.9	0.4	ND	.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/11/86	12/11/86	12/11/86	12/11/86	

ND - not detected at detection limit times factor

Aero [illegible]
Matter [illegible]
December [illegible]

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000625	000626	000627	000628	[illegible]
Compound	Concentration mg/L				
Bromide	ND	ND	ND	ND	0.1
Chloride	2.5	7.5	4.3	4.1	0.1
Fluoride	ND	ND	ND	ND	0.1
Nitrate, as N	1.3	ND	0.6	ND	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	1.5	ND	0.6	ND	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/11/86	12/11/86	12/11/86	12/11/86	

ND - not detected at detection limit times factor

[illegible]
Mather AFB
December [illegible]

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000629	000630	000631	000632	[illegible]
Compound	Concentration mg L				
Bromide	ND	ND	0.2	0.7	[illegible]
Chloride	11	11	19	17	0.1
Fluoride	ND	0.2	ND	0.4	0.1
Nitrate, as N	ND	ND	3.3	0.9	0.1
Nitrite, as N	ND	ND	0.7	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	12	12	210	50	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/12/86	12/12/86	12/12/86	12/12/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000633	000634	000635	000636	[illegible]
Compound			Concentration mg/L		
Bromide	0.3	0.2	0.5	ND	[illegible]
Chloride	4.4	4.9	4.5	ND	[illegible]
Fluoride	0.2	0.2	0.2	ND	[illegible]
Nitrate, as N	1.1	2	0.8	ND	[illegible]
Nitrite, as N	0.5	ND	0.4	ND	[illegible]
Phosphate, as P	ND	ND	ND	ND	[illegible]
Sulfate	14	17	21	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/12/86	12/12/86	12/12/86	12/12/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000637	000638	000639	000640	999999
Compound	Concentration mg/L				
Bromide	0.6	0.6	0.2	0.2	0.1
Chloride	20	3.4	28	22	0.1
Fluoride	ND	0.2	0.2	0.2	0.1
Nitrate, as N	0.7	ND	ND	0.8	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	240	2	6.2	5.3	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/12/86	12/12/86	12/14/86	12/14/86	

ND - not detected at detection limit times factor

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	ND	[illegible]	[illegible]
[illegible]	[illegible]	ND	ND	[illegible]	[illegible]
[illegible]	ND	ND	ND	ND	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

ND = not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000645	000646	000647	000648	[illegible]
Compound	Concentration mg/L				
Bromide	0.5	0.4	ND	ND	0.1
Chloride	3.7	2.9	2.4	16	0.1
Fluoride	0.3	0.3	0.2	ND	0.1
Nitrate, as N	1	ND	1.3	5.4	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	0.5	ND	ND	0.1
Sulfate	2.1	5	4.5	10	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/14/86	12/14/86	12/14/86	12/14/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 429 Results

Sample Type:	LAN *	LAN *	LAN *	LAN *	DET
Sample ID#:	000649	000650	000651	000652	999999
Compound	Concentration mg/L				
Bromide	0.2	0.5	ND	ND	.1
Chloride	2.9	3.9	2.2	3.1	0.1
Fluoride	0.2	0.3	0.2	0.3	0.1
Nitrate, as N	2.2	ND	3.2	3.4	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	4.3	3	2.6	2.8	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/16/86	12/16/86	12/16/86	12/16/86	

ND - not detected at detection limit times factor

* Data for nitrate/nitrite invalid, holding time exceeded

Aerovironment
Mather AFB
December 1986

Table 1. Analysis Type: 429 Results

Sample Type:	LAN *	LAN	LAN	LAN	DET
Sample ID#:	000657	000658	000659	000660	######
Compound	Concentration mg/L				
Bromide	0.6	ND	ND	ND	0.1
Chloride	4.7	6	5	ND	0.1
Fluoride	.3	0.2	0.2	ND	0.1
Nitrate, as N	ND	1.8	1.8	ND	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	7.6	19	18	ND	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/16/86	12/16/86	12/16/86	12/16/86	

ND - not detected at detection limit times factor

* Data for nitrate/nitrite invalid, holding time exceeded

Table 1. Analysis Type: 429 Results

Sample Type:	LAN *	LAN *	LAN *	LAN *	DET
Sample ID#:	000653	000654	000655	000656	??????
Compound	Concentration mg/L				
Bromide	ND	0.4	0.4	ND	0.1
Chloride	2.5	2.4	2.4	2.4	0.1
Fluoride	0.2	0.2	0.2	0.2	0.1
Nitrate, as N	3	0.4	ND	2.7	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	2.1	6.8	4.5	4.2	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/16/86	12/16/86	12/16/86	12/16/86	

ND - not detected at detection limit times factor

* Data for nitrate/nitrite invalid, holding time exceeded

Table 1. Analysis Type: 429 Results

Sample Type:	LAN	DET
Sample ID#:	000601	999999
Compound	Concentration mg/L	
Bromide	ND	0.1
Chloride	3.4	0.1
Fluoride	0.4	0.1
Nitrate, as N	4.1	0.1
Nitrite, as N	ND	0.1
Phosphate, as P	ND	0.1
Sulfate	1.6	0.1

Detection limit factor: 1.00

Analysis date: 12/16/86

ND - not detected at detection limit times factor

Aero [illegible]
Mather AFB
December [illegible]

Analysis Type: 429 IA

Sample Type:	MB1	MB2	MB3	MB4	DET
Sample ID#:	999998	999993	999993	999999	[illegible]
Compound		Concentration mg/L			
Bromide	ND	ND	ND	ND	0.1
Chloride	ND	ND	ND	ND	0.1
Fluoride	ND	ND	ND	ND	0.1
Nitrate, as N	ND	ND	ND	ND	0.1
Nitrite, as N	ND	ND	ND	ND	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	ND	ND	ND	ND	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/10/86	12/11/86	12/12/86	12/14/86	

ND - not detected at detection limit times factor

Analysis Type: 429 QA

Sample Type:	MBS	LDU	LDU	LDU	DET
Sample ID#:	999998	000607	000622	000633	999999
Compound			Concentration mg/L		
Bromide	ND	0.2	ND	0.2	0.1
Chloride	ND	7	2.5	4.4	0.1
Fluoride	ND	ND	ND	0.2	0.1
Nitrate, as N	ND	4	1.6	1.1	0.1
Nitrite, as N	ND	ND	ND	0.5	0.1
Phosphate, as P	ND	ND	ND	ND	0.1
Sulfate	ND	6.5	1.3	14	0.1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/16/86	12/10/86	12/11/86	12/12/86	

ND - not detected at detection limit times factor

[illegible]
Matter [illegible]
December [illegible]

Analysis Type: 4[illegible]

Sample Type:	LDU	LDU	LDU	LSP	DET
Sample ID#:	[illegible]645	000647	000655	[illegible]	[illegible]
Compound		Concentration mg/L			
Bromide	0.4	ND	0.4	99 %	[illegible]
Chloride	2.9	2.5	2.5	99 %	[illegible]
Fluoride	[illegible]	[illegible]	[illegible]	92 %	[illegible]
Nitrate, as N	ND	1.[illegible]	0.[illegible]	110 %	[illegible]
Nitrite, as N	ND	ND	ND	99 %	[illegible]
Phosphate, as P	0.5	ND	ND	99 %	[illegible]
Sulfate	5	4.5	4.5	105 %	[illegible]

Detection limit factor: 1.00 1.00 1.00 1.00

Analysis date: 12/14/86 12/14/86 12/15/86 12/11/86

ND - not detected at detection limit times factor
% - Percent spike recovery (spiked at 1.0 mg/L)

[illegible]
Mather AFB
December 1986

Analysis Type: 429 QA

Sample Type:	LSP	LSP	DET
Sample ID#:	000674	000656	999909
Compound	**Concentration mg/L**		
Bromide	96 %	105 %	0.1
Chloride	91 %	96 %	0.1
Fluoride	84 %	92 %	0.1
Nitrate, as N	95 %	100 %	0.1
Nitrite, as N	92 %	98 %	0.1
Phosphate, as P	92 %	99 %	0.1
Sulfate	95 %	98 %	0.1
Detection limit factor:	1.00	1.00	1.00
Analysis date:	12/12/86	12/16/86	12/16/86

ND - not detected at detection limit times factor
% - Percent spike recovery (spiked at 1.0 mg/L)

ACUREX Corporation

DEC 1986

Energy & Environmental Division

NOVEMBER 22, 1986

AEROVIRONMENT, INC.
825 MYRTLE AVENUE
MONROVIA, CA 91016

ATTENTION: CHRIS LOVDAHL

SUBJECT: ANALYSIS OF MATHER AIR FORCE BASE SAMPLES

SAMPLES WERE ANALYZED FOR PETROLEUM HYDROCARBONS BY EXTRACTION WITH FREON, PASSING THE EXTRACT ACROSS SILICA GEL, AND THEN ANALYZING THE SOLVENT BY INFRARED SPECTROSCOPY USING EPA METHOD 418.1. THE RESULTS ARE PRESENTED IN TABLE 1 WITH QA RESULTS IN TABLE 2.

PREPARED BY: Lorna I. Imbat
LORNA IMBAT
ANALYST

APPROVED BY: Greg Nicoll
GREG NICOLL
MANAGER, INORGANIC CHEMISTRY

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

Table 1. Analysis Type: 418.1 Results

Sample Type:	LAN	LAN	LAN	DET
Sample ID#:	000790	000791	000801	999999
Compound		Concentration mg/L		
Petroleum Hydrocarbons	ND	ND	ND	1
Detection limit factor:	1.00	1.00	1.00	
Analysis date:	11/21/86	11/21/86	11/21/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 418.1 QA

Sample Type:	MB1	DET
Sample ID#:	999998	999999
Compound	Concentration mg/L	
Petroleum Hydrocarbons	ND	1

Detection limit factor: 1.00

Analysis date: 11/21/86

ND - not detected at detection limit times factor

ACUREX Corporation

Energy & Environmental Division

December 22, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed for petroleum hydrocarbons by extraction with freon, passing the extract over silica gel, and measuring the hydrocarbon peak of the extract by infrared spectrometry using EPA Method 418.1. The results are presented in Table 1 with QA results in Table 2.

Prepared by: ____________
J. Romeo M. Milanes
Chemist

Approved by: Greg Nicoll
Greg Nicoll
Manager, Inorganic Chemistry

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX (415) 964-5145

Table 1. Analysis Type: 418.1 Results

Sample Type:	[illegible]	DET
Sample ID#:	[illegible]578	[illegible]
Compound	**Concentration mg/L**	
Petroleum Hydrocarbons	ND	1

Detection limit factor: 1.00

Analysis date: 10/13/86

ND = not detected at detection limit times factor

[illegible]
[illegible]
December [illegible]

Table 1. Analysis Type: 418.1 IR

Sample Label:	MB1	DET
Sample ID#:	[illegible]	[illegible]
Compound	Concentration mg/L	
Petroleum Hydrocarbons	ND	1

Detection limit factor: 1.00

Analysis date: 12/18/85

ND = not detected at detection limit times factor

ACUREX
Corporation

Energy & Environmental Division

DEC 15 1986

December 2, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed for total cyanides by distillation/colorimetry (EPA method 335.2). The results are presented in Table 1 with QA results in Table 2.

Prepared by: June Romeo Maramba Milanes
Chemist

Approved by: Greg Nicoll
Manager, Inorganic Chemistry

485 Clyde Avenue. P.O. Box 7044. Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

Table 1. Analysis Type: 335.2 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000784	000785	000786	000787	999999
Compound	Concentration mg/L				
Total Cyanides	0.02	ND	ND	ND	0.[illegible]5
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/26/86	11/26/86	11/26/86	11/26/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 335.2 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000788	000789	000790	000791	999999
Compound	Concentration mg/L				
Total Cyanides	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/26/86	11/26/86	11/26/86	11/26/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 335.2 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000792	000793	000794	000795	999999
Compound	Concentration mg/L				
Total Cyanides	ND	ND	ND	ND	0.[illegible]5
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/26/86	11/26/86	11/26/86	11/26/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 335.2 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000796	000797	000798	000799	999999
Compound	Concentration mg/L				
Total Cyanides	ND	0.025	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/26/86	11/26/86	11/26/86	11/26/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 335.2 Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000800	000801	999999
Compound	Concentration mg/L		
Total Cyanides	0.02	ND	0.005
Detection limit factor:	1.00	1.00	
Analysis date:	11/26/86	11/26/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 335.2 QA

Sample Type:	MB1	LDU	LDU	LSP	DET
Sample ID#:	999998	000795	000796	000797	999999
Compound	Concentration mg/L				
Total Cyanides	ND	ND	ND	75 %	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	11/26/86	11/26/86	11/26/86	11/26/86	

ND - not detected at detection limit times factor
% - percent spike recovery (spiked at 0.10 mg/L)

Table 1. Analysis Type: 335.2 QA

Sample Type:	LSP	DET
Sample ID#:	999997	999999
Compound		
Total Cyanides	100 %	0.005

Detection limit factor: 1.00

Analysis date: 11/26/86

ND - not detected at detection limit times factor
* - percent recovery of Quality Control sample 9903 (0.12 mg cyanide/L)

ACUREX Corporation

Energy & Environmental Division

December 22, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed for total cyanides by distillation/colorimetry using EPA Method 335.2. The results are presented in Table 1 with QA results in Table 2.

Prepared by: J. Romeo M. Milanes
Chemist

Approved by: Greg Nicoll
Greg Nicoll
Manager, Inorganic Chemistry

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

[illegible]
Method [illegible]
December [illegible]

Table 1. Analysis Type: [illegible] Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	Concentration mg/L				
Total [illegible]	ND	ND	ND	ND	[illegible]
Detection Limit Factor:	1.[illegible]	1.[illegible]	1.[illegible]	1.	
Analysis date:	12 19 85	12 19 85	12 19 86	12 19 86	

ND = not detected at detection limit times factor

Table 1. Analysis Type: [illegible] Results

Sample Type:	CAN	CAN	CAN	CAN	[illegible]
Sample ID#:	[illegible]14	[illegible]29	[illegible]	[illegible]	[illegible]
Units: [illegible]	Concentration mg/L				
Total Cyanides	ND	ND	ND	ND	[illegible]
Detection Limit Factor:	1.00	1.00	1.00	1.00	
Analysis Date:	12/19/86	12/19/86	12/19/86	12/19/86	

ND = not detected at detection limit times factor

Page [illegible]
Matrix [illegible]
Detection [illegible]

Table 1. Analysis Type: [illegible] Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	Concentration mg/L				
Total Cyanides	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	[illegible]	
Analysis date:	12/19/85	12/19/85	12/19/85	12/19/85	

ND - not detected at detection limit times factor

[illegible]
[illegible]
[illegible]

Table 1. Analysis Type: 335.2 Results

Sample Type:	CHN	CHN	CHN	CHN	[illegible]
Sample ID#:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	Concentration mg/L				
Total Cyanides	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/19/86	12/19/86	12/19/86	12/19/86	

ND = not detected at detection limit times factor

Table 1. Analysis Type: 335.2 Results

Sample Type:	LAN	LAN	DET
Sample ID#:	000640	000641	999999
Compound	Concentration mg/L		
Total Cyanides	ND	ND	0.005
Detection limit factor:	1.00	1.00	
Analysis date:	12/19/86	12/19/86	

ND = not detected at detection limit times factor

[illegible]
[illegible]
[illegible]

Table 1. Analysis Type: 335.2 CN

Sample type:	MB1	MB2	LDL	LDL	DET
Sample ID#:	999999	999999	006516	006519	[illegible]
Compound	Concentration mg/L				
Total Cyanides	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis date:	12/19/86	12/19/86	12/19/86	12/19/86	

ND = not detected at detection limit times factor

Table [illegible]. Analysis Type: [illegible]

Sample Type:	LSP	DET
Sample ID#:	000540	999999
Compound	Concentration mg/L	
Total Cyanides	100 %	0.005

Detection Limit Factor: 1.00

Analysis Date: 12/19/86

ND = not detected at detection limit times factor
% = spike recovery (sample spiked at 0.1 mg/L)

ACUREX Corporation

Energy & Environmental Division

December 2, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed for total phenols by distillation/colorimetry (EPA method 420.1). The results are presented in Table 1 with QA results in Table 2.

Prepared by: June Romeo Maramba Milanes
Chemist

Approved by: Greg Nicoll
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Table 1. Analysis Type: 420.1 Results

Sample Type:	LAN	LAN	LAN	DET
Sample ID#:	000790	000791	000801	999999
Compound		Concentration mg/L		
Total Phenols	0.024	0.046	0.030	0.005
Detection limit factor:	1.00	1.00	1.00	
Analysis date:	11/25/86	11/25/86	11/25/96	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 420.1 Results

Sample Type:	MB1	LSP	DET
Sample ID#:	999998	999997	999999
Compound	Concentration mg/L		
Total Phenols	ND	116 *	0.005
Detection limit factor:	1.00	1.00	
Analysis date:	11/25/86	11/25/86	

ND - not detected at detection limit times factor
* - percent recovery of Quality Control sample 9903 (0.086 mg phenol/L)

ACUREX
Corporation

Energy & Environmental Division

December 22, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdanl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed for total phenols by distillation/colorimetry using EPA Method 420.1. The results are presented in Table 1 with QA results in Table 2.

Prepared by: J. Romeo M. Milanes
Chemist

Approved by: Greg Nicoll
Greg Nicoll
Manager, Inorganic Chemistry

485 Clyde Avenue, PO Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX (415) 964-5145

Table 1. Analysis Type: 420.1 QA

Sample Type:	CAN	DET
Sample ID#:	[illegible]	500090
Compound	Concentration mg/L	
Total Phenols	ND	[illegible]

Detection Limit Factor: [illegible]

Analysis date: 12 15 85

ND = not detected at detection limit times factor

[illegible]

Table 1 Analysis Type: [illegible]

Sample Type:	[illegible]	[illegible]
Sample ID#:	[illegible]	[illegible]
Compound	Concentration mg/L	
Total Phenols	ND	0.005

Detection Limit Factor: 1.00

Analysis Date: 12 15 85

ND = not detected at detection limit times factor

DEC [illegible] 1986

ACUREX
Corporation

Energy & Environmental Division

NOVEMBER 22, 1986

AEROVIRONMENT, INC.
825 MYRTLE AVENUE
MONROVIA, CA 91016

ATTENTION: CHRIS LOVDAHL

SUBJECT: ANALYSIS OF MATHER AIR FORCE BASE SAMPLES

SAMPLES WERE ANALYZED FOR TDS USING EPA METHOD 160.1. RESULTS OF THE GRAVIMETRIC MEASUREMENTS ARE PRESENTED IN TABLE 1 WITH QA RESULTS IN TABLE 2.

PREPARED BY: J. ROMEO MILANES
CHEMIST

APPROVED BY: Greg Nicoll
GREG NICOLL
MANAGER, INORGANIC CHEMISTRY

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000751	000752	000753	000754	999999
Compound	Concentration mg/L				
Total Dissolved Solids	170	190	170	100	10
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/12/86	11/12/86	11/12/86	11/12/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000755	000756	000757	000758	999999
Compound			Concentration mg/L		
Total Dissolved Solids	100	150	200	120	1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/12/86	11/12/86	11/12/86	11/12/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000759	000760	000761	000762	999999
Compound	Concentration mg/L				
Total Dissolved Solids	140	81	130	[illegible]	1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/13/86	11/13/86	11/13/86	11/13/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000763	000764	000765	000766	999999
Compound			Concentration mg/L		
Total Dissolved Solids	130	230	120	120	10
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/13/86	11/13/86	11/14/86	11/14/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000767	000768	000769	000770	999999
Compound			Concentration mg/L		
Total Dissolved Solids	140	120	130	160	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/14/86	11/14/86	11/14/86	11/14/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000771	000772	000773	000774	999999
Compound	Concentration mg/L				
Total Dissolved Solids	120	11	210	150	10
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/15/86	11/15/86	11/15/86	11/15/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN *	LAN	LAN	LAN	DET
Sample ID#:	000775	000776	000777	000778	999999
Compound	Concentration mg/L				
Total Dissolved Solids	140	180	ND	120	10
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/17/86	11/15/86	11/15/86	11/17/86	

ND - not detected at detection limit times factor
Note: Sample 000775 received on 11/17/86

* Data invalid, holding time exceeded

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000779	000780	000781	000783	999999
Compound			Concentration mg/L		
Total Dissolved Solids	96	84	140	86	10
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/17/86	11/17/86	11/17/86	11/17/86	

ND - not detected at detection limit times factor

AeroVironment
Mather AFB
November 1986

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000784	000785	000786	000787	999999
Compound			Concentration mg/L		
Total Dissolved Solids	290	230	130	190	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/17/86	11/17/86	11/17/86	11/17/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000788	000789	000790	000791	999999
Compound	Concentration mg/L				
Total Dissolved Solids	130	730	100	100	10
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/17/86	11/17/86	11/18/86	11/18/86	

ND - not detected at detection limit times factor

Aerovironment
Mather AFB
November 1986

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000792	000793	000794	000795	999999
Compound	Concentration mg/L				
Total Dissolved Solids	890	420	150	120	10
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/18/86	11/18/86	11/18/86	11/18/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN *	LAN *	DET
Sample ID#:	000796	000797	000798	000799	999999
Compound	Concentration mg/L				
Total Dissolved Solids	390	420	260 q	260 q	10
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/19/86	11/19/86	11/21/86	11/21/86	

ND - not detected at detection limit times factor
q - Sample originally ran on 11/19/86 on nitric acid preserved aliquot due to laboratory error.

* Data invalid, holding time exceeded

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN *	LAN	DET
Sample ID#:	000800	000801	999999
Compound	Concentration mg/L		
Total Dissolved Solids	220 q	ND	10
Detection limit factor:	1.00	1.00	
Analysis started:	11/21/86	11/19/86	

ND - not detected at detection limit times factor
q - Sample originally ran on 11/19/86 on nitric acid preserved aliquot due to laboratory error.

* Data invalid, holding time exceeded

Aerovironment
Mather AFB
November 1986

Table 2. Analysis Type: 160.1 QA

Sample Type:	MB1	MB2	MB3	MB4	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound			Concentration mg/L		
Total Dissolved Solids	ND	ND	ND	ND	1.
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/12/86	11/13/86	11/14/86	11/15/86	

ND - not detected at detection limit times factor

AeroVironment
Mather AFB
November 1986

Table 2. Analysis Type: 160.1 QA

Sample Type:	MB1	MB2	MB3	MB4	DET
Sample ID#:	999998	999998	999998	999998	999999
Compound			Concentration mg/L		
Total Dissolved Solids	ND	ND	ND	ND	10
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/17/86	11/18/86	11/19/86	11/21/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 160.1 QA

Sample Type:	LDU	LDU	LDU	LDU	DET
Sample ID#:	000762	000767	000772	000789	999999
Compound	Concentration mg/L				
Total Dissolved Solids	120	120	ND	690	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	11/13/86	11/14/86	11/15/86	11/17/86	

ND - not detected at detection limit times factor

Table 2. Analysis Type: 160.1 QA

Sample Type:	LDU	LSP	DET
Sample ID#:	000801	999997	999999
Compound	Concentration mg/L		
Total Dissolved Solids	ND	94 *	10
Detection limit factor:	1.00	1.00	
Analysis started:	11/19/86	11/19/86	

ND - not detected at detection limit times factor
* - percent recovery of Quality Control sample 9903 (1090 mg TDS/L)

ACUREX Corporation

DEC 22 1986

Energy & Environmental Division

December 18, 1986

AeroVironment, Inc.
825 Myrtle Avenue
Monrovia, CA 91016

Attention: Chris Lovdahl

Subject: Analysis of Mather Air Force Base Samples

Samples were analyzed by gravimetric measurement for total dissolved solids using EPA method 160.1. The results are presented in Table 1 with QA results in Table 2.

Prepared by: J. Romeo M. Milanes
Chemist

Approved by: Greg Nicoll
Manager, Inorganic Chemistry

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000601	000602	000603	000604	######
Compound	Concentration mg/L				
Total Dissolved Solids	160	98	170	190	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/10/86	12/09/86	12/09/86	12/09/86	

ND - not detected at detection limit times factor

Table 1.   Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000605	000606	000607	000608	999999
Compound	Concentration mg/L				
Total Dissolved Solids	110	140	190	190	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/10/86	12/10/86	12/10/86	12/10/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000609	000610	000611	000612	999999
Compound	Concentration mg/L				
Total Dissolved Solids	110	26[illegible]	95	72	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/10/86	12/10/86	12/10/86	12/10/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000613	000614	000615	000616	[illegible]
Compound	Concentration mg/L				
Total Dissolved Solids	98	560	100	170	1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/10/86	12/10/86	12/12/86	12/11/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000617	000618	000619	000620	######
Compound	Concentration mg/L				
Total Dissolved Solids	130	48	1600	62	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/11/86	12/11/86	12/12/86	12/11/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000621	000622	000623	000624	999999
Compound	Concentration mg/L				
Total Dissolved Solids	150	81	140	180	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/11/86	12/11/86	12/11/86	12/11/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000625	000626	000627	000628	999999
Compound	Concentration mg L				
Total Dissolved Solids	120	150	130	180	[illegible]
Detection Limit Factor:	1.00	1.00	1.00	1.00	
Analysis started:	12 11 86	12 11/86	12/11 86	12/11 86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000629	000630	000631	000632	[illegible]
Compound			Concentration mg/L		
Total Dissolved Solids	90	86	730	350	1
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/12/86	12/12/86	12/12/86	12/12/86	

ND - not detected at detection limit times factor

[illegible]
Matrix [illegible]
December [illegible]

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000633	000634	000635	000636	[illegible]
Compound			Concentration mg/L		
Total Dissolved Solids	150	170	140	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/12/86	12/12/86	12/12/86	12/12/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000637	000638	000639	000640	999999
Compound			Concentration mg/L		
Total Dissolved Solids	300	78	380	300	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/12/86	12/12/86	12/14/86	12/14/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: [illegible] Results

Sample Type:	LAN	LAN	LAN	LAN	ET
Sample ID#:	000641	00 642	000643	0 644	[illegible]
Compound	Concentration mg/L				
Total Dissolved Solids	280	84	1[illegible]0	2[illegible]	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/14/85	12/14/86	12/14/85	12/14/86	

ND - not detected at detection limit times factor

[illegible]
[illegible]
[illegible]

Table 1. Analysis Type: 15[illegible] Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000545	000546	000547	000548	[illegible]
Compound	Concentration mg/L				
Total Dissolved Solids	63	54	[illegible]	25	[illegible]
Detection limit factor:	1.00	1.00	1.00	[illegible]	
Analysis started:	12/14/86	12/14/86	12/14/86	12/14/86	

ND - not detected at detection limit times factor

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	[illegible]
Sample ID#:	000649	000650	000651	[illegible]	[illegible]
Compound		Concentration mg L			
Total Dissolved Solids	130	120	140	140	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/15/86	12/15/86	12/15 86	12 15 86	

ND - not detected at detection limit times factor

Appendix A
Weather [illegible]
December [illegible]

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	[illegible]
Sample ID#:	000653	000654	000655	000656	[illegible]
Compound			Concentration mg/L		
Total Dissolved Solids	120	110	58	190	[illegible]
Detection Limit Factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/15/86	12/15/86	12/15/86	12/15/86	

ND - not detected at detection limit times factor

[illegible]
Mather AFB
December [illegible]

Table 1. Analysis Type: 160.1 Results

Sample Type:	LAN	LAN	LAN	LAN	DET
Sample ID#:	000657	000658	000659	000660	[illegible]
Compound	Concentration mg/L				
Total Dissolved Solids	120	210	210	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/15/86	12/15/86	12/15/86	12/15/86	

ND - not detected at detection limit times factor

Table 1.   Analysis Type: 160.1 Results

Sample Type:	L-N	DET
Sample ID#:	000001	999999
Compound	Concentration mg/L	
Total Dissolved Solids	110	10

Detection limit factor: 1.0

Analysis started: 12 15 85

ND = not detected at detection limit times factor

[illegible]
Mather AFB
December 198[illegible]

Table 1. Analysis Type: 160.1 QA

Sample Type:	MB1	MB2	MB3	MB4	DET
Sample ID#:	999998	999998	999998	999998	[illegible]
Compound	Concentration mg/L				
Total Dissolved Solids	ND	ND	ND	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/09/86	12/10/86	12/11/86	12/12/86	

ND - not detected at detection limit times factor

Table [illegible]. Analysis Type: 160.1 QA

Sample Type:	MB5	MB6	LDU	LDU	DET
Sample ID#:	999999	999998	000610	000621	999999
Compound			Concentration mg/L		
Total Dissolved Solids	ND	ND	270	140	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/14/86	12/15/86	12/10/86	12/11/86	

ND - not detected at detection limit times factor

[illegible]
Mather AFB
December [illegible]

Table 1. Analysis Type: 160.1 DA

Sample Type:	LDU	LDU	LDU	LDU	DET
Sample ID#:	[illegible]676	000545	000545	[illegible]	999999
Compound	Concentration mg/L				
Total Dissolved Solids	ND	57	70	ND	[illegible]
Detection limit factor:	1.00	1.00	1.00	1.00	
Analysis started:	12/12/86	12/14/86	12/14/86	12/15/86	

ND - not detected at detection limit times factor

HAZARDOUS WASTE TESTING LABORATORY CERTIFICATION LIST

HAZARDOUS MATERIALS LABORATORY SECTION
CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY, BERKELEY, CALIFORNIA 94704
06/06/86

Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

PHONE :(415)964-3200

CERTIFICATE NO: 125

LAB CATEGORY: Commercial

DATE CERTIFIED: 06/06/86

ORGANIC CHEMICAL TESTING (Y = CERTIFIED, N = NOT CERTIFIED)

1.1 Organochlorine Pesticides ---------------------------------------Y
1.2 Chlorinated Herbicides --Y
1.3 Phenols ---Y
1.4 Halogenated Volatile Organics -----------------------------------Y
1.5 Polychlorinated Biphenyls (PCBs)---------------------------------Y
1.6 Carbamates --N
1.7 GC/MS Method for Semivolatile Organics (B/N/A)-------------------Y
1.8 Non-Halogenated Volatile Organics -------------------------------Y
1.9 Aromatic Volatile Organics --------------------------------------Y
1.10 Acrolein, Acrylonitrile, Acetonitrile --------------------------Y
1.11 Phthalate Esters ---Y
1.12 Nitroaromatics and Cyclic Ketones ------------------------------Y
1.13 Polynuclear Aromatic Hydrocarbons ------------------------------Y
1.14 Chlorinated Hydrocarbons ---------------------------------------Y
1.15 Organophosphorus Pesticides ------------------------------------Y
1.16 Volatile Organics by Mass Spectrometry--------------------------Y

INORGANIC AND OTHER TESTING (Y = CERTIFIED, N = NOT CERTIFIED)

2.1 Antimony -------------------Y
2.2 Arsenic --------------------Y
2.3 Barium ---------------------Y
2.4 Beryllium ------------------Y
2.5 Cadmium --------------------Y
2.6 Chromium(VI) ---------------Y
2.7 Chromium(total) ------------Y
2.8 Cobalt ---------------------Y
2.9 Copper ---------------------Y
2.10 Lead ----------------------Y
2.11 Mercury -------------------Y
2.12 Molybdenum ----------------Y
2.13 Nickel --------------------Y
2.14 Selenium ------------------Y
2.15 Silver --------------------Y
2.16 Thallium ------------------Y
2.17 Vanadium ------------------Y
2.18 Zinc ----------------------Y

NON-METALLIC

2.19 Cyanide ------------------Y
2.20 Fluoride -----------------Y
2.21 Sulfide ------------------N

OTHER

3.0 Bulk Asbestos Testing -----N

4.0 Physical Property Testing -N

5.0 Aquatic Toxicity Testing --N

6.0 CA Waste Extraction Test --Y

Anion/Cation Balance Data

NE Perimeter

Shallow Wells

STATION NAME OR NUMBER	MG	CA	NA+K	CO3+ HCO3	SO4	CL
	-----------MILLIGRAMS PER LITER-----------					
	--------MILLEQUIVALENTS PER LITER----------					
DH73G1	4.30	9.10	13.40	100.00	12.00	3.70
	0.35	0.45	0.56	1.64	0.25	0.10
DH75G1	6.10	11.00	10.70	62.00	6.80	4.90
	0.50	0.55	0.44	1.02	0.14	0.14
DH76G1	6.50	13.00	9.96	49.00	3.30	11.00
	0.53	0.65	0.42	0.80	0.07	0.31

Deep Wells

STATION NAME OR NUMBER	MG	CA	NA+K	CO3+ HCO3	SO4	CL
DH64G1	0.15	2.10	36.70	57.00	29.00	6.40
	0.01	0.10	1.53	1.24	0.60	0.18
DH65G1	3.40	8.70	18.80	60.00	15.00	7.30
	0.28	0.43	0.79	0.98	0.31	0.21
DH66G1	0.24	4.70	38.40	70.00	49.00	8.90
	0.02	0.23	1.61	1.25	1.02	0.25

ACW

Shallow Wells

STATION NAME OR NUMBER	MG	CA	NA+K	CO3+ HCO3	SO4	CL
	-----------MILLIGRAMS PER LITER-----------					
	--------MILLEQUIVALENTS PER LITER----------					
DH01G1	5.40	15.00	[illegible]	58.00	[illegible]	[illegible]
	0.44	0.80	0.40	1.11	[illegible]	[illegible]
DH02G1	5.40	12.00	48.90	120.00	[illegible]	6.50
	0.44	0.60	[illegible]	1.97	0.60	[illegible]
DH03G1	2.10	6.20	10.50	26.00	[illegible]	4.40
	0.17	0.31	0.44	0.43	[illegible]	[illegible]
DH50G1	3.40	7.30	17.40	49.00	[illegible]	[illegible]
	0.28	0.36	[illegible]	0.80	0.08	[illegible]
DH51G1	4.40	8.30	12.70	47.00	[illegible]	[illegible]
	0.36	0.41	0.52	0.77	[illegible]	[illegible]
DH52G1	4.70	11.00	21.60	67.00	6.70	5.90
	0.39	0.55	0.89	1.10	0.14	[illegible]
DH53G1	3.10	7.80	16.00	43.00	[illegible]	[illegible]
	0.26	0.39	0.68	0.70	0.12	[illegible]
DH54G1	4.50	8.50	14.90	51.00	3.50	[illegible]
	0.37	0.42	0.61	0.84	0.07	[illegible]

Deep Wells

STATION NAME OR NUMBER	MG	CA	NA+K	CO3+ HCO3	SO4	CL
DH67G1	1.60	4.90	48.30	81.00	28.00	[illegible]
	0.13	0.24	2.06	1.33	0.58	[illegible]
DH68G1	3.10	8.70	16.00	49.00	9.10	[illegible]
	0.26	0.43	0.66	0.80	0.19	0.15
DH69G1	2.20	11.00	[illegible]	[illegible]	[illegible]	[illegible]
	0.18	0.55	0.56	1.12	0.14	[illegible]
DH70G1	3.10	7.20	21.40	68.00	[illegible]	[illegible]
	0.26	0.36	0.85	1.11	[illegible]	[illegible]
DH71G1	1.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	0.09	0.28	[illegible]	0.56	[illegible]	[illegible]
DH72G1	1.20	4.50	45.30	[illegible]	[illegible]	[illegible]
	0.10	[illegible]	1.97	1.29	0.54	[illegible]

7100 Landfill

Shallow Wells

STATION NAME OR NUMBER	MG	CA	NA+K	CO3+ HCO3	SO4	CL
	------------	MILLIGRAMS PER LITER	------------			
	--------	MILLEQUIVALENTS PER LITER	------------			
DH40G1	3.9	8.90	9.55	51.00	2.00	1.70
	0.32	0.44	0.40	0.84	0.04	0.05
DH41G1	17.00	37.00	15.50	150.00	46.00	7.40
	1.40	1.85	0.69	2.46	0.96	0.21
DH42G1	25.00	44.00	59.00	56.00	100.00	24.00
	2.06	2.20	2.51	0.92	2.08	0.68
DH43G1	0.00	5.50	24.10	68.00	2.40	3.80
	0.00	0.27	0.96	1.25	0.05	0.11
DH44G1	33.00	74.00	26.10	310.00	10.00	29.00
	2.71	3.69	1.10	5.08	0.21	0.82
DH45G1	22.00	46.00	21.10	240.00	5.80	22.00
	1.81	2.30	0.88	3.93	0.12	0.62
DH37G1	65.00	120.00	31.70	460.00	260.00	22.00
	5.35	5.99	1.33	7.54	5.41	0.62
DH38G1	14.00	25.00	19.90	110.00	48.00	14.00
	1.15	1.25	0.83	1.80	1.00	0.39
DH39G1	57.00	100.00	30.00	350.00	200.00	19.00
	4.76	4.99	1.27	5.74	4.16	0.54

Deep Wells

STATION NAME OR NUMBER	MG	CA	NA+K	CO3+ HCO3	SO4	CL
DH55G1	2.50	19.00	17.70	106.00	6.00	3.80
	0.21	0.95	0.72	2.11	0.12	0.11
DH56G1	0.16	23.00	47.90	60.00	65.00	5.80
	0.01	1.15	2.03	2.00	1.35	0.19
DH57G1	0.14	75.00	62.70	240.00	39.00	7.40
	0.01	3.74	2.66	3.97	0.81	0.21
DH58G1	1.70	6.90	33.10	49.00	28.00	24.00
	0.14	0.34	1.38	0.80	.58	.66

West Ditch

Shallow Wells

STATION NAME OR NUMBER	MG	CA	NA+K	CO3+ HCO3	SO4	CL
	------------	MILLIGRAMS PER LITER	------------			
	--------	MILLEQUIVALENTS PER LITER	------------			
DH46G1	15.00	31.00	16.70	130.00	8.90	12.00
	1.23	1.55	0.70	2.13	0.19	0.34
DH47G1	13.00	25.00	14.60	4.00	8.20	7.40
	1.07	1.25	0.61	0.07	0.17	0.21
DH48G1	6.50	13.00	9.96	49.00	3.30	11.00
	0.53	0.65	0.42	0.80	0.07	0.31
DH49G1	1.50	9.60	18.50	63.00	3.70	3.30
	0.12	0.48	0.74	1.34	0.08	0.09
DH10G1	7.40	15.00	11.40	73.00	3.90	12.00
	0.61	0.75	0.47	1.20	0.08	0.34
DH11G1	9.80	18.00	11.20	77.00	5.50	21.00
	0.72	0.90	0.47	1.26	0.11	0.59

Deep Wells

STATION NAME OR NUMBER	MG	CA	NA+K	CO3+ HCO3	SO4	CL
DH59G1	0.37	5.40	32.10	57.00	19.00	11.00
	0.03	0.27	1.34	1.04	0.40	0.31
DH60G1	2.00	7.80	36.00	86.00	38.00	24.00
	0.16	0.39	1.48	1.41	0.79	0.68
DH61G1	0.46	14.00	26.50	99.00	5.10	2.50
	0.04	0.70	1.11	1.62	0.13	0.07
DH62G1	0.00	12.00	45.30	92.00	38.00	7.80
	0.00	0.60	1.89	2.22	0.79	0.22
DH63G1	2.50	16.00	14.20	77.00	5.10	5.00
	0.21	0.80	0.58	1.57	0.11	0.14

Base Production Wells

[illegible]	[illegible]	[illegible]	[illegible]	CO3+ HCO3	SO4	[illegible]
			MILLIGRAMS PER LITER / MILLIEQUIVALENTS PER LITER			
[illegible]	[illegible]	[illegible]	14.40	110.00	0.00	4.10
	[illegible]	[illegible]	0.57	1.80	0.00	[illegible]
[illegible]	[illegible]	20.00	14.80	110.00	0.00	[illegible]
	[illegible]	1.00	0.58	1.80	0.00	[illegible]
[illegible]	[illegible]	[illegible]	12.10	28.00	0.00	3.10
	[illegible]	0.65	0.47	0.62	0.00	[illegible]
[illegible]	4.40	12.00	15.00	78.00	0.00	7.50
	0.40	0.50	0.64	1.28	0.00	0.21
[illegible]	[illegible]	12.00	12.30	68.00	0.60	4.30
	0.48	0.60	0.49	1.11	0.01	0.12
[illegible]	1.00	7.30	3.77	41.00	1.90	[illegible]
	[illegible]	0.37	0.35	0.67	0.04	0.06
[illegible]	[illegible]	3.50	8.70	42.00	1.50	[illegible]
	[illegible]	0.43	0.34	0.69	0.03	[illegible]
[illegible]	5.10	11.00	15.70	76.00	0.40	5.50
	0.42	0.55	0.70	1.25	0.01	0.16
[illegible]	15.00	24.00	15.60	140.00	10.00	15.00
	1.72	1.70	0.69	2.29	0.21	[illegible]
[illegible]	4.10	9.10	8.60	47.00	4.50	2.40
	[illegible]	0.45	0.36	0.77	0.09	[illegible]

APPENDIX H

References

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APPENDIX I

Professional Resumes

S. Eccker
P. Herrera
C. Lovdahl
K. Napp
T. O'Gara
K. Pettus
D. Taylor
S. Thurston

RESUME

Sandra Eccker
Geochemist
Earth Sciences Section
Environmental Measurements Department
Environmental Programs Division
AeroVironment Inc.

Technical Specialties

Soil Gas Sampling
Gas Chromatography
Water Quality Analysis
Remote Sensing
Colorimetric Spectroscopy

Professional Experience

Ms. Eccker is a geochemist at AeroVironment, where she specializes in investigations of hazardous waste contamination in soil, water, and vadose zone. She is an expert in soil gas sampling and analysis using a portable gas chromatograph to delineate the type, source, and extent of contamination. Based on this field work she is able to specify locations where soil should be removed or monitoring wells installed. In her previous employment with Keck Consulting Services she also pursued this problem of hazardous waste contamination.

In earlier work for Resource Consultants, she provided the U.S. Army Corps of Engineers with litigation suppor n the Rocky Mountain Arsenal's groundwater contamination suit against Shell Oil. This involved investigating and documenting the history and development of the contamination problem by reconstructing the history of lease agreements, chemical manufacturing operations, and methods and locations of waste disposal at the site. In work for the Forest Service, she evaluated remote sensing techniques, including infrared aerial photographs, for use in pest management.

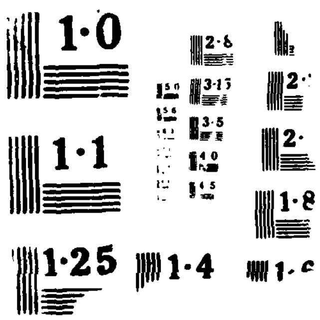
At Chevron Oil, Ms. Eccker worked extensively with a Hewlett Packard 5840 gas chromatograph to improve its analytical performance. She then rebuilt and tested the response of its flame ionization detector. To complete the study, she wrote a design and operation manual for the HP5840.

Education

M.S., Geology, Colorado State University, 1984
B.A., Chemistry, Smith College, 1980

AD-A194 900 INSTALLATION RESTORATION PROGRAM PHASE 2 CONFIRMATION/QUANTIFICATION STAGE 3(U) AEROVIRONMENT INC MONROVIA CA 05 FEB 88 AV-FR-86/596 9/10

UNCLASSIFIED F33615-83-D-4000 F/G 24/4 NL


1·0
1·1
1·25
1·4
1·8

RESUME

Paul D. Herrera
Environmental Scientist/Engineer
Environmental Analysis and Modeling Department
AeroVironment Inc.

Technical Specialties

Computer Graphics
Data Reduction and Statistics
Air Quality, Water Quality and Visibility Data Analysis

Professional Experience

Mr. Herrera analyzes a wide variety of air quality data, from visual range to point measurements. This analysis entails the use of computer graphics interpreted by developing software capable of reducing the data and providing pertinent statistical information. He also works with the Hazardous Waste Group. He is experienced in designing, logging, developing and sampling groundwater monitoring wells. In addition, he has been trained in taking soil samples with a hollow-stem auger, using the "California-" or "Ring-" type sampler.

Before working for AeroVironment, Mr. Herrera was employed by the National Oceanic Atmospheric Administration as an environmental scientist/engineer. There he participated in field and research projects. Some of his duties were to collect air and water samples, to organize incoming data, and to perform programming and analysis. He was also involved in such research fields as atmospheric chemistry, water chemistry and air toxics.

Education

B.S., Environmental Science/Engineering, New Mexico Highlands University, 1986

Professional Affiliation

Air Pollution Control Association, Member
Pollution Engineering, Member
ACM, Member

RESUME

Christopher W. Lovdahl
Environmental Chemist
Environmental Programs Division
AeroVironment Inc.

Technical Specialties

Analytical Chemistry
Environmental Chemistry
Hazardous Materials Handling

Professional Experience

Mr. Lovdahl provides chemistry support to projects related to hazardous waste handling, environmental compliance and site evaluation. He has conducted three site visits as part of a large project to audit environmental compliance of 11 U.S. Air Force manufacturing plants. Besides reviewing applicable regulations for hazardous waste generation, storage and disposal, he also assessed risks from underground storage tanks and evaluated waste minimization alternatives at the plants. In a waste inventory program for a research facility in the state of Washington, he helped prepare a waste-handling manual, identified disposal alternatives and collected high concentration drum samples.

Mr. Lovdahl is a key member of AeroVironment's Installation Restoration Program project team. He is responsible for most chemistry aspects of the site characterization and sampling activities, including sampling plan preparation, coordinating laboratory functions and conducting laboratory system and performance audits. Having an extensive background in laboratory quality assurance/quality control, Mr. Lovdahl reviews all analytical data, and evaluates field QC sample data as part of AeroVironment's QA/QC program.

In his previous position with the Cadillac Motor Car Division of General Motors, Mr. Lovdahl was an analytical chemist responsible for analysis of water and hazardous waste samples using spectrophotometry, atomic emission spectroscopy, GC (ECD,FID), GC/MS, ICP and HPLC. All environmental lab work was conducted according to established EPA procedures and QA/QC protocols. As part of his lab position, he worked with plant personnel to assure that proper sampling methods were used for water and wastes to be analyzed in the laboratory. Before joining the laboratory staff, Mr. Lovdahl served as an associate engineer for toxic/hazardous materials management at Cadillac. In that position, he was responsible for

developing, implementing and maintaining hazardous waste management programs at three manufacturing plants. This work included waste sampling, identification of hazardous waste generation, implementation of handling procedures and approval of RCRA TSD facilities used for disposal of Cadillac's wastes.

Mr. Lovdahl has also worked for Great Lakes Environmental Services, where he coordinated three large laboratory chemical disposal projects. He was also involved in plant environmental surveys that included sampling, determination of necessary analytical testing, permitting and reporting. In another phase of that project, Mr. Lovdahl evaluated client facilities for compliance with hazardous waste, wastewater and spill control regulations.

Education

B.S., Environmental Science, University of Michigan, Dearborn, 1980

Professional Memberships

American Chemical Society

RESUME

Kenneth F. Napp
Associate Hydrogeologist
Earth Sciences Section
Environmental Measurements Department
Environmental Programs Division

Technical Specialties

- Water well inspection and design
- Groundwater/vadose monitoring
- Fluvial geomorphology and sedimentology
- Soil analysis and characterization
- Sampling protocols
- RCRA regulations and UST standards

Professional Experience

Since joining AV, Mr. Napp has primarily been involved in AV's Installation Restoration Program projects with the U.S. Air Force. His responsibilities include design, placement and lithologic logging of water wells, drilling supervision, groundwater sampling, interpretation of geophysical logs and writing of reports. He is also involved in underground storage tank (UST) investigation, compliance programs and site assessment. His duties include supervision of UST precision integrity tests, tank and pipe excavating and design and placement of vadose and groundwater monitoring wells. These tasks require fluency in California state, county and local UST standards.

Prior to joining AV, Mr. Napp provided consulting services to the oil and gas industry in Denver, Colorado. He specialized in correlating surface and subsurface sandstone mineralogy, porosity, petroleum potential, and diagenetic history of Cretaceous and Permian oil-bearing strata.

Education

M.S., Geology, Colorado State University, 1985
B.S., Geology, State University of New York at Albany, 1981
CSU continuing education courses:
Groundwater Engineering, 1986
Solutions to Groundwater Problems, 1986

RESUME

Timothy F. O'Gara
Hydrogeologist
Field Operations
AeroVironment Inc.

Technical Specialties

Hazardous Waste Investigations
Groundwater Monitoring
Water Supply Well Design and Inspection

Professional Experience

Mr. O'Gara is a hydrogeologist in the Environmental Programs Division at AeroVironment. In this capacity, he provides key support to AV's hazardous waste projects. He has served as field team leader on site investigations for various corporate and government clients. These investigations have included installation of numerious ground water monitoring wells and continuous soil sampling to depths of 80 feet. He has been responsible for field portions of investigations at several bases in the western U.S. under an Installation Resoration Program contract for the U.S. Air Force. For these programs, he has written and implemented soil and water sampling procedures, designed and installed ground water monitoring wells, and served as the technical contact with drilling and geophysical subcontractors. He is responsible for writing those sections of reports dealing with geology and hydrogeology.

As a member of AeroVironment's hazardous waste investigation team, Mr. O'Gara has received training in EPA methods for soil and water sampling, as well as for site safety and respiratory protection.

Before joining AV, Mr. O'Gara was self-employed as a contracting hydrogeologist. During this time, he provided specialized hydrology and geology consulting to several consulting firms in Southern California. He directed drilling and soil sampling programs for numerous leaking underground storage tank investigations at facilities in the Los Angeles area. These programs were conducted in accordance with the guidelines adopted by the California Regional Water Quality Control Board. His responsibilities included insuring that proper safety, sampling protocol, and chain of custody procedures were followed throughout the investigation. He was also responsible for selecting the test boring sites. In other consulting work, he provided design and on-site inspection for groundwater projects as diverse as municipal water supply wells and multiple completion piezometer networks.

In previous employment by James M. Montgomery Consulting Engineers (JMM), Mr. O'Gara served as the resident geologist at the initial closure of the Stringfellow Quarry Class I hazardous waste site. In that capacity, he supervised the placement of the subsurface containment barrier, the installation of down-gradient monitoring wells, and the monitoring of groundwater conditions during the construction. Other assignments included field inspection for extension of the Alamitos Injection Well Salinity Barrier for Orange County Water District, installation of various piezometer networks, and performance of isolated zone tests in deep wells. The latter projects helped to determine the water quality of specific aquifers within multiple aquifer systems.

Education

B.A., Earth Science, California State University, Fullerton, 1980

Professional Affiliations

National Water Well Association, Association of Ground Water Scientists and Engineers

RESUME

Keith J. Pettus
Manager, Quality Assurance Department
AeroVironment Inc.

Technical Specialties

Air Quality Instrumentation
Air Chemistry

Professional Experience

Mr. Pettus manages air monitoring data quality assurance on AeroVironment's air quality, meteorology, and visibility measurement programs. His activities include instrument calibration, instrument audits, data validation, and statistical analysis of data quality. He currently oversees the internal QC functions of two visibility monitoring stations which AV operates in Arizona for the Electric Power Research Institute. He is also providing external quality assurance assistance to Salt River Projects air quality monitoring stations near its Navajo generating station. Recently, he was assistant quality assurance manager in the EPA-sponsored PEPE/NEROS study. AV provided quality assurance for the entire project, which involved the interaction of many organizations in taking a complex series of intensive ground-based and airborne measurements. He has also managed an audit program for [illegible] air quality monitoring sites near Tucson, Arizona.

Before joining AeroVironment, Mr. Pettus was an air pollution instrument technician with the South Coast Air Quality Management District. His duties included instrument maintenance, data reduction, data reporting, and some instrument repair.

Mr. Pettus was a Postgraduate Research Chemist at the Statewide Air Pollution Research Center on U.C. Riverside's campus, where he was involved with instrument calibration, instrument repair, data collection, data validation, chemical and biological experimentation and analysis of environmental samples. His projects included formation and characterization of nitrosamines and nitrobenzo-A-pyrenes, and studies on diesel fuels and jet plane exhaust for the Air Force. Among instruments he used were the NMR and IR spectrometers.

Education

B.S., Chemistry, University of California, Riverside, 1977
U.S. EPA Air Pollution Training Institute Course, Quality Assurance for Air Pollution Measurement Systems

Professional Memberships

Air Pollution Control Association

RESUME

Douglas B. Taylor, P.E.
Project Manager
Hazardous Waste Projects Group
Environmental Programs Division
AeroVironment Inc.

Technical Specialties

Hazardous Waste Management
Waste Site Characterization
Wastewater Treatment

Professional Experience

Mr. Taylor serves as a key project manager in the Hazardous Waste Program for AeroVironment. In this capacity he is responsible for field activities, project planning, engineering input, schedule and budget control and team management. He is currently managing a *level-of-effort* Air Force contract related to the Installation Restoration Program for assessing and investigating hazardous waste at bases throughout the country. He is working on three extensive investigations of potential soil and groundwater contamination at Air Force bases in the western United States, resulting from leaking tanks and poor waste management. Mr. Taylor also manages and provides technical support to environmental audits, waste inventories, and private property site characterizations. He also serves as corporate health and safety officer.

Mr. Taylor previously worked for Ecology and Environment Inc. as the group leader for preliminary assessments and site inspections on the EPA's field investigation team contract in Denver, Colorado. As group leader, he managed routine assignments, including site inspections, sampling projects and impact assessments at over 50 sites in EPA Regions 3 and 8. He has prepared engineering reports for EPA sites including a remedial investigation plan for the McAdoo Drum site in Pennsylvania, a cost estimate report for slag isolation in Philadelphia, and a delisting analysis for a National Priority List site in Utah. Additional specialized work included managing several geotechnical/hydrological drilling projects and drum opening activities.

Mr. Taylor also worked on a variety of water quality and hazardous waste related projects for D'Appolonia Consultants. He was the principal engineer in the investigation of a toxic waste impoundment at the Rocky Mountain Arsenal in Denver. For the Strategic Petroleum Reserve, he provided water quality studies and investigated treatment alternatives for raw water used in the expansion of salt caverns.

Education

M. Engr., Environmental Engineering, Pennsylvania State University, 1980

B.S., Environmental Engineering, Pennsylvania State University, 1979

Registration

Professional Engineer, Colorado and California

Professional Memberships

American Society of Civil Engineers
American Water Works Association
Chi Epsilon
Water Pollution Control Federation

RESUME

Sheryl Thurston
Environmental Engineer
Environmental Programs Division
AeroVironment Inc.

Technical Specialties

Waste Site Evaluation
Environmental Compliance
Impact Assessment

Professional Experience

Ms. Thurston serves as an engineer supporting AeroVironment projects in the areas of regulatory compliance, air toxics problems and waste site investigation projects for the U. S. Air Force. She is currently working on two site investigations, Beale AFB and Mather AFB, which are being investigated to evaluate possible contamination from fuel spills, storage tank leaks, landfills and poor waste handling. Ms. Thurston's responsibilities include collecting soil samples with hollow stem auger equipment, monitoring and logging cuttings from well-drilling operations, and designing and developing groundwater monitoring wells. Ms. Thurston has also worked on environmental compliance audits at Air Force manufacturing facilities. She was responsible for background research and report writing.

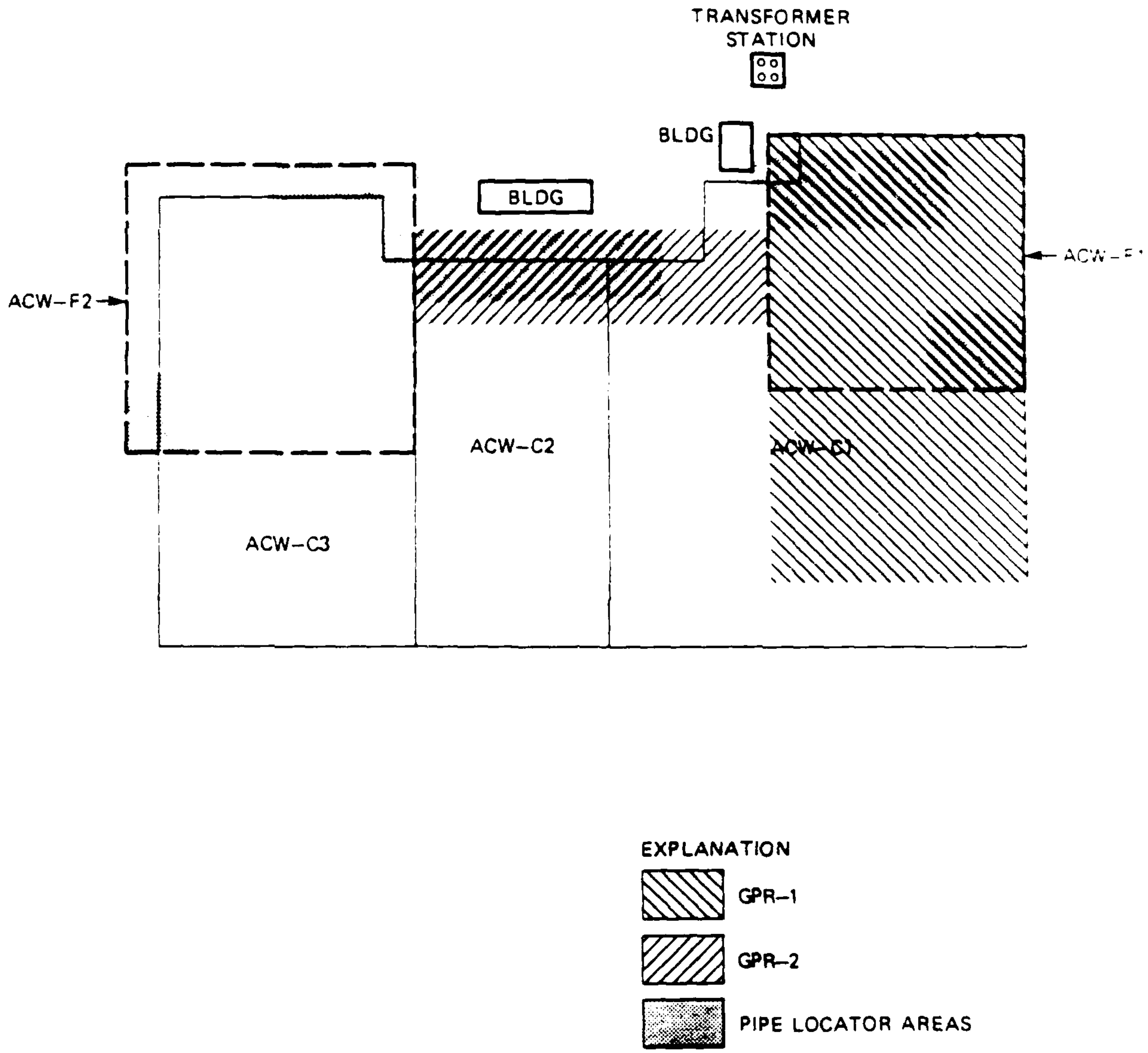
Prior to working for AV, Ms. Thurston served as a summer intern with the Rhode Island Department of Environmental Management (DEM). While with DEM, she conducted research and prepared an annual report on hazardous waste management in Rhode Island, which was submitted to the EPA. She also participated in RCRA groundwater testing and inspection of hazardous waste generators, transporters and storage sites within the state.

Education

B.S., Environmental Engineering, Northwestern University, Evanston, IL, 1985

APPENDIX J

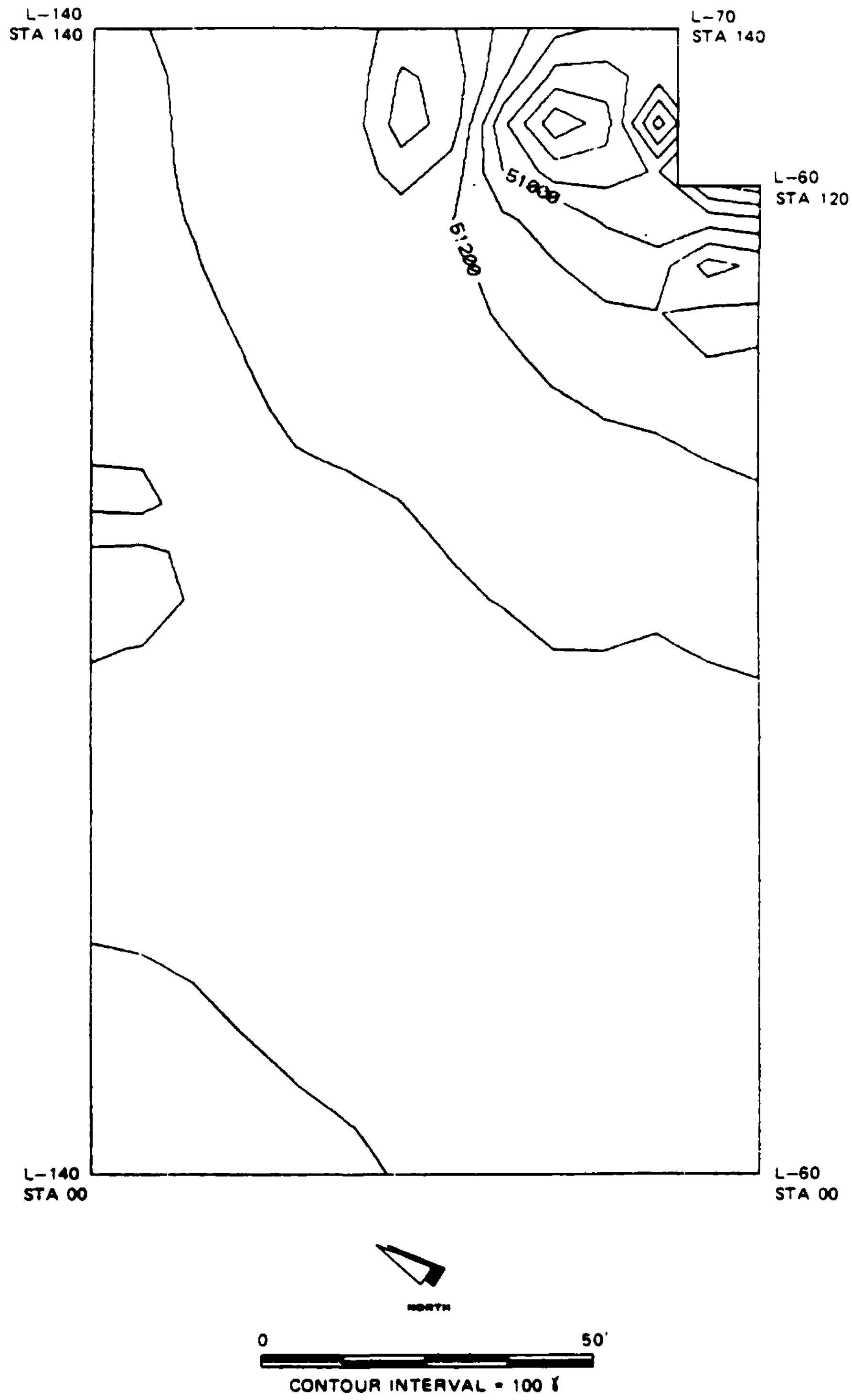
Geophysical Surveys, Data and Maps



The Earth Technology Corporation

ACW DISPOSAL SITE
GPR AND PIPE LOCATOR LOCATION MAP

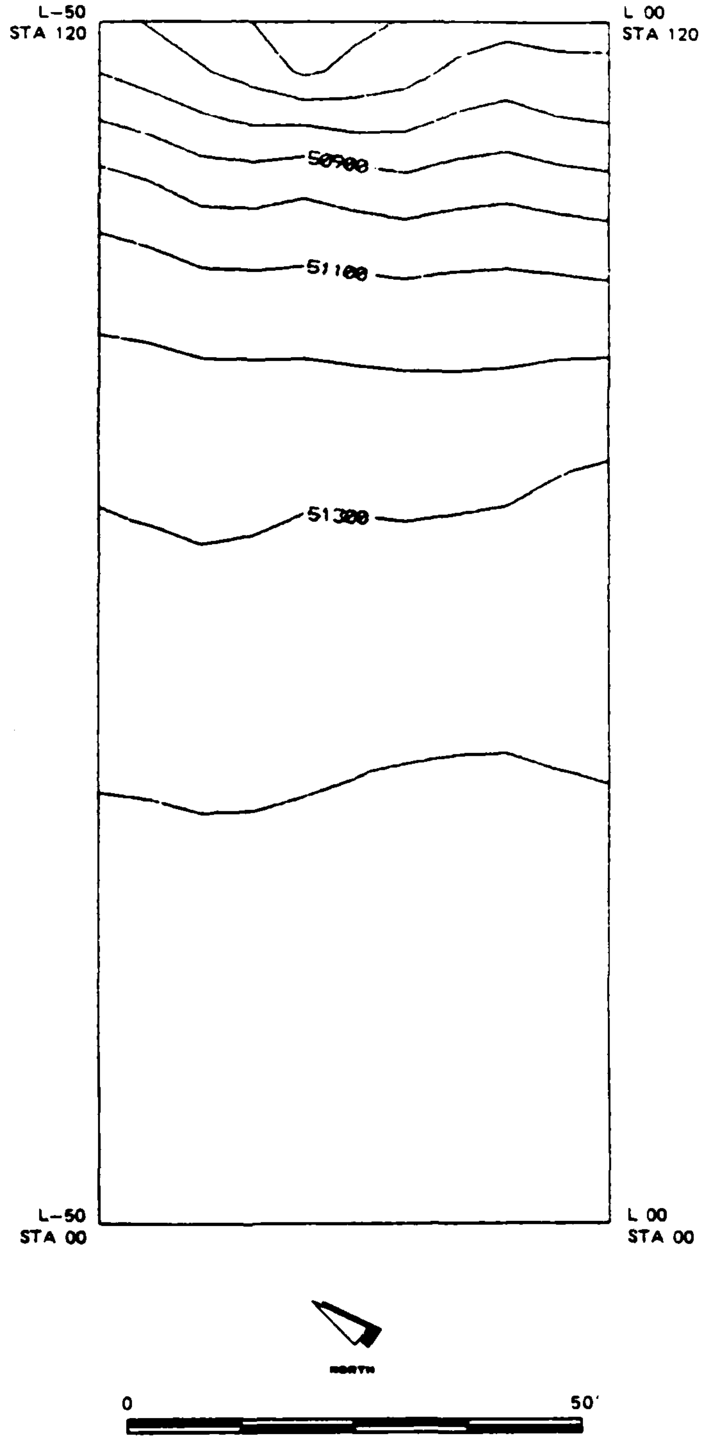
FIGURE 1



The Earth Technology Corporation

ACW DISPOSAL SITE
GRID ACW-C3
TOTAL FIELD MAGNETICS CONTOUR MAP

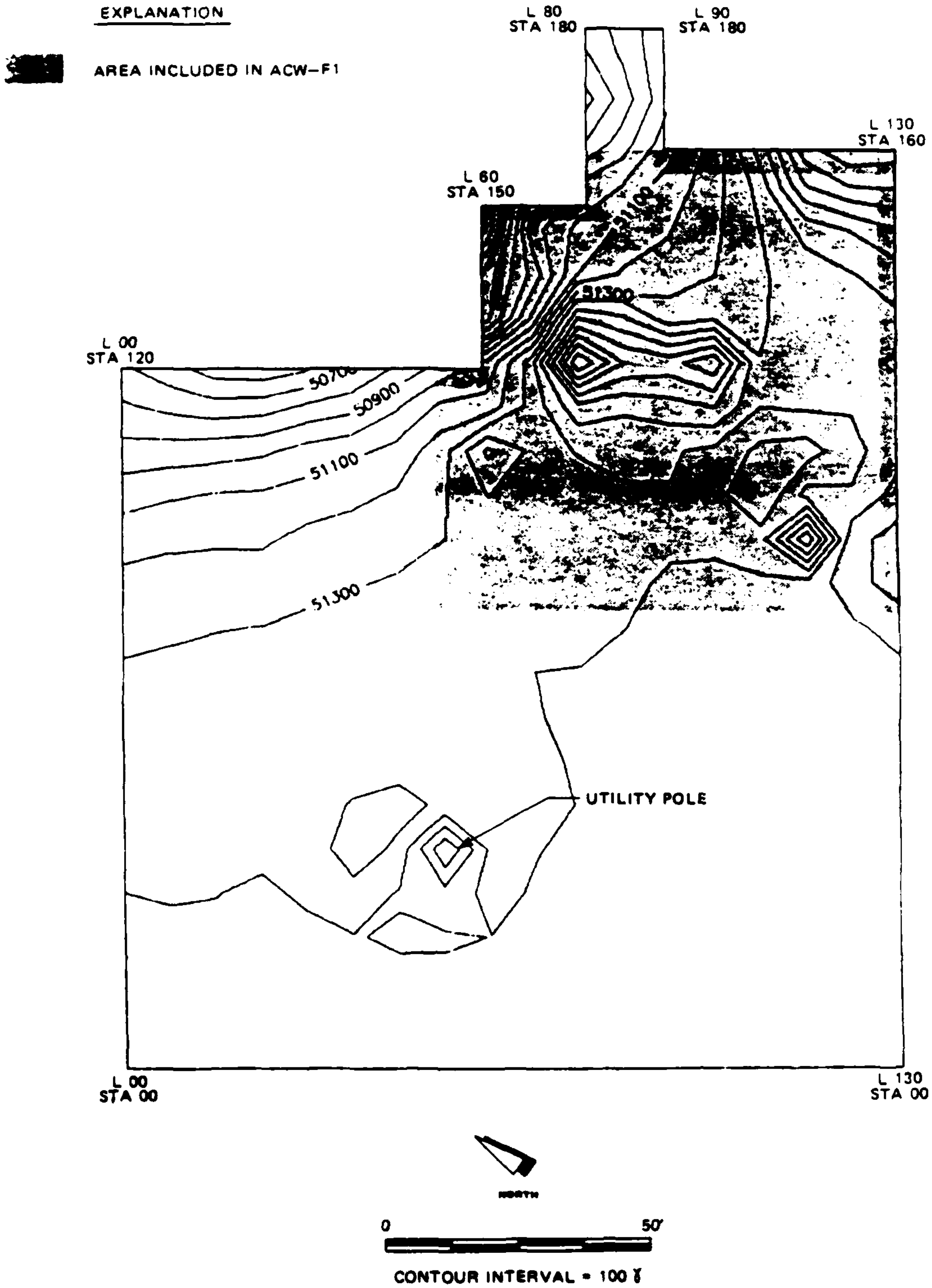
FIGURE
2



The Earth Technology Corporation

ACW DISPOSAL SITE
GRID ACW-C2
TOTAL FIELD MAGNETICS CONTOUR MAP

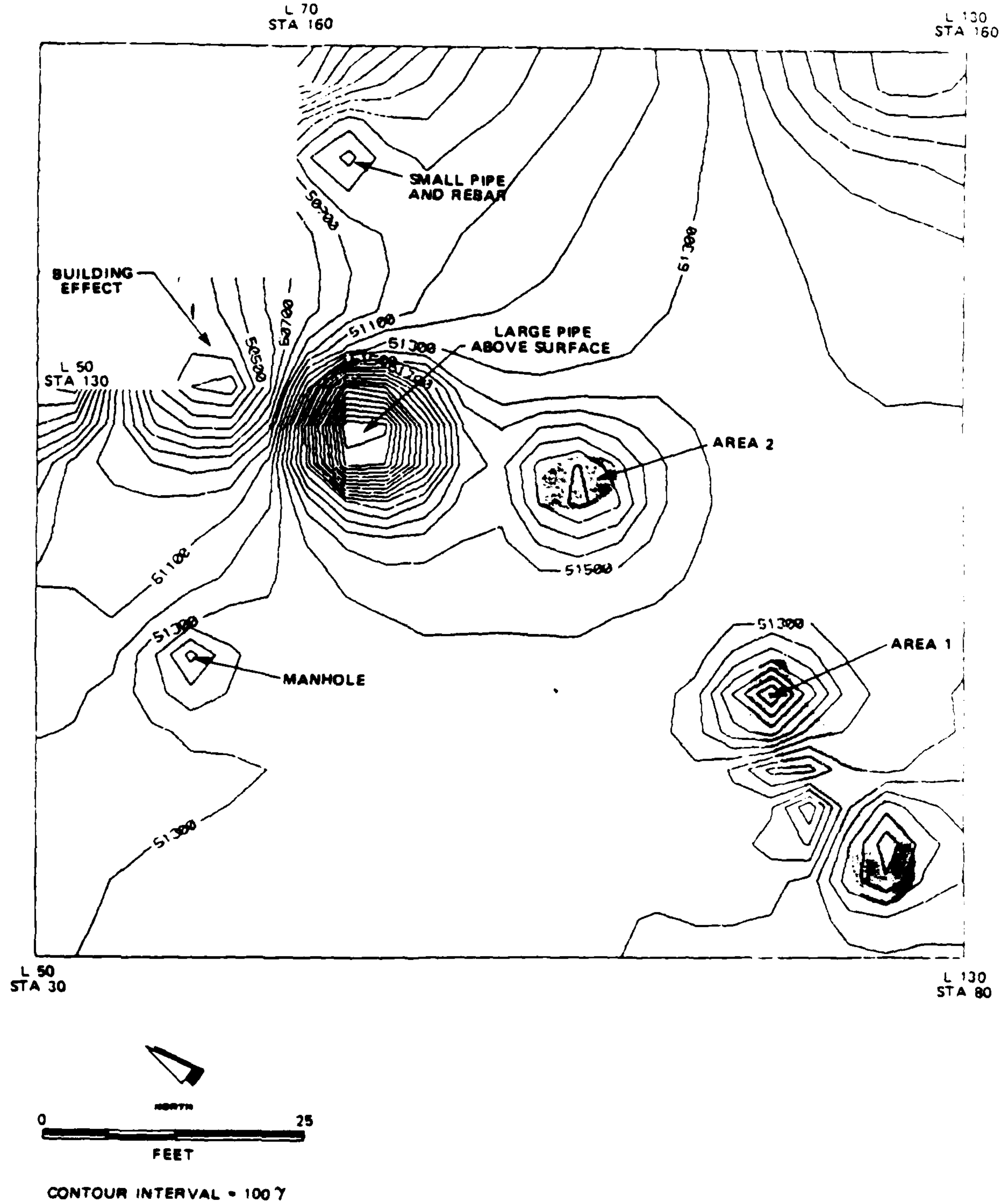
FIGURE 3



The Earth Technology Corporation

ACW DISPOSAL SITE
GRID ACW-C1
TOTAL FIELD MAGNETICS CONTOUR MAP

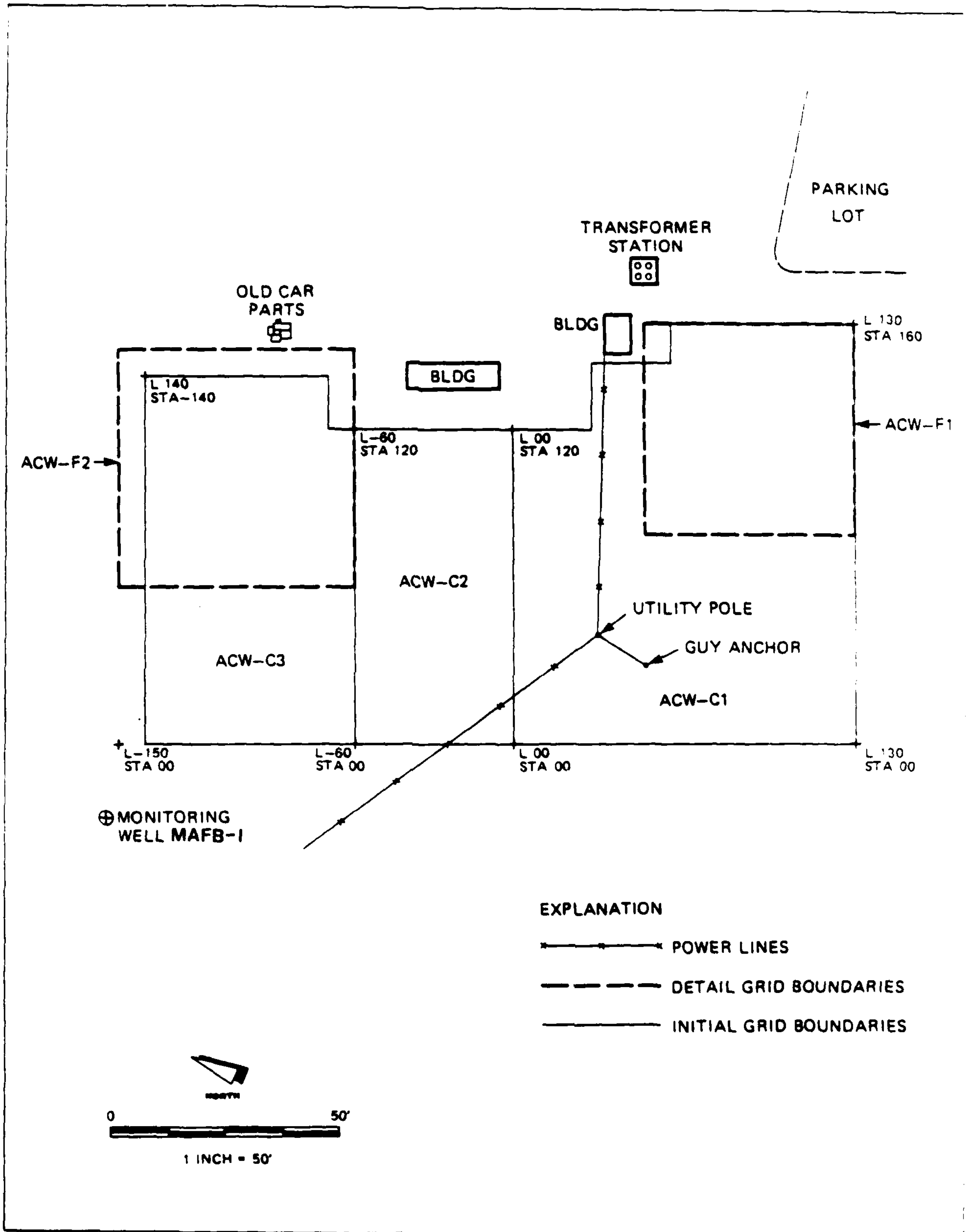
FIGURE 4



The Earth Technology Corporation

ACW DISPOSAL SITE
GRID ACW–F1
TOTAL FIELD MAGNETICS CONTOUR MAP

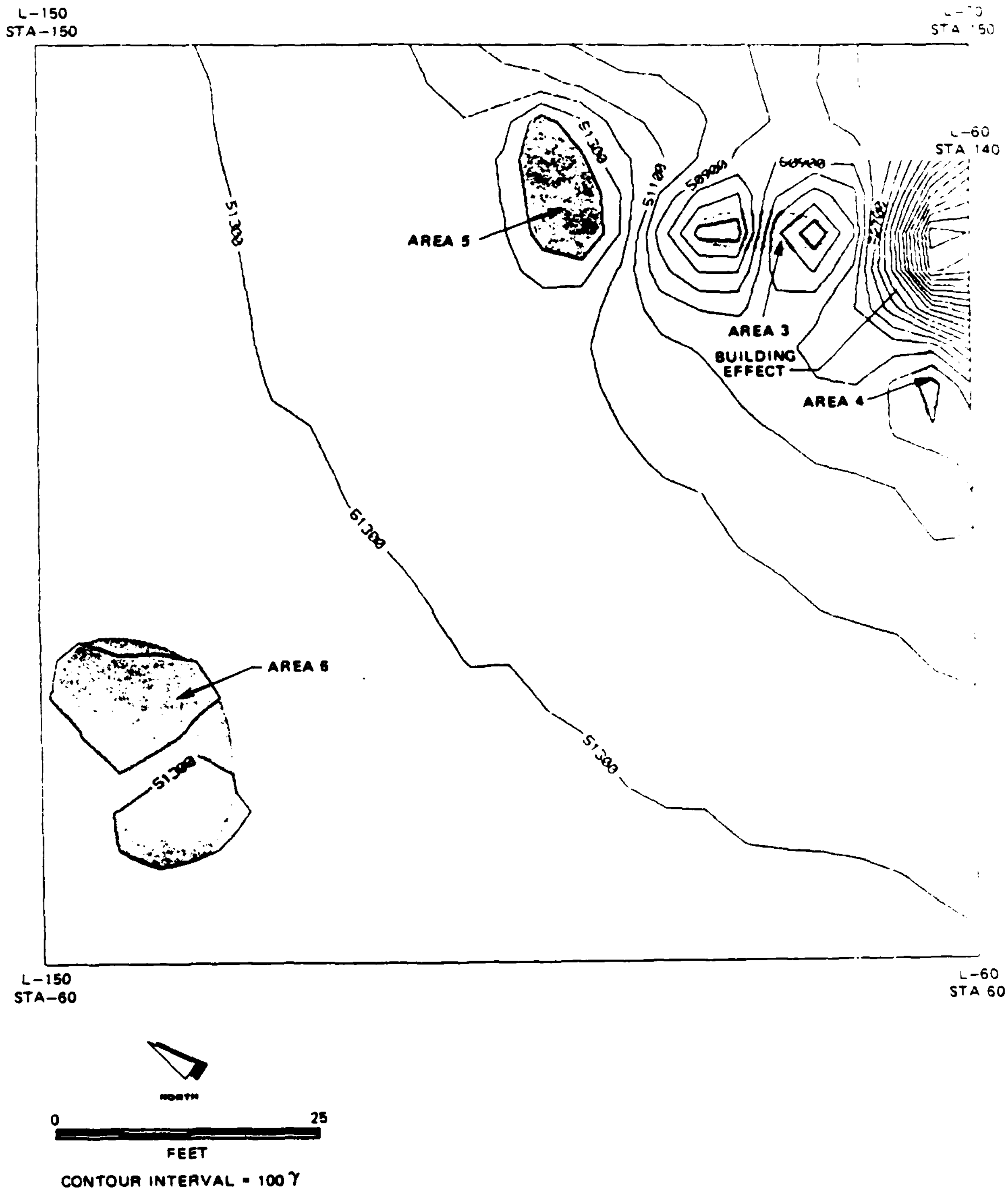
FIGURE 5



The Earth Technology Corporation

ACW DISPOSAL SITE
MAGNETIC GRID LOCATION MAP

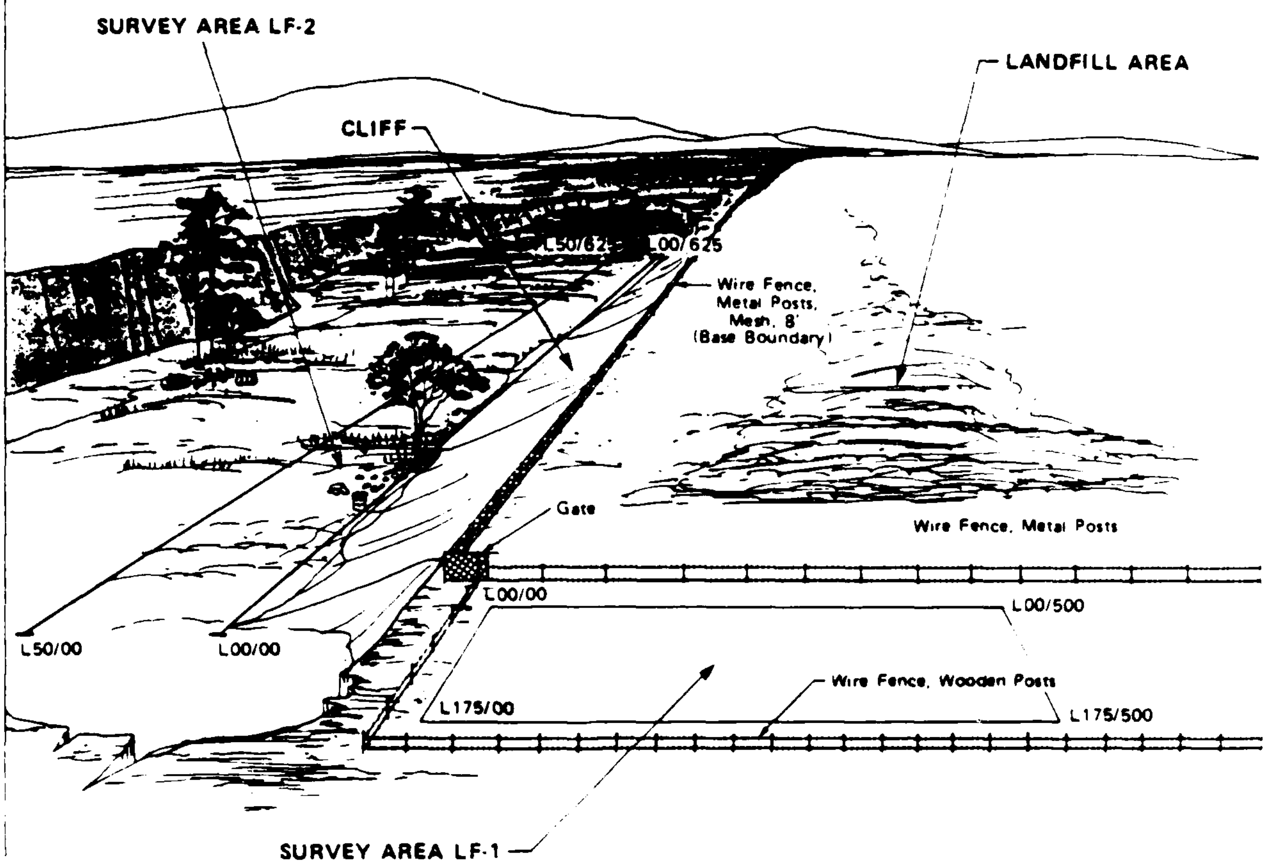
FIGURE 6



The Earth Technology Corporation

ACW DISPOSAL SITE
GRID ACW-F2
TOTAL FIELD MAGNETICS CONTOUR MAP

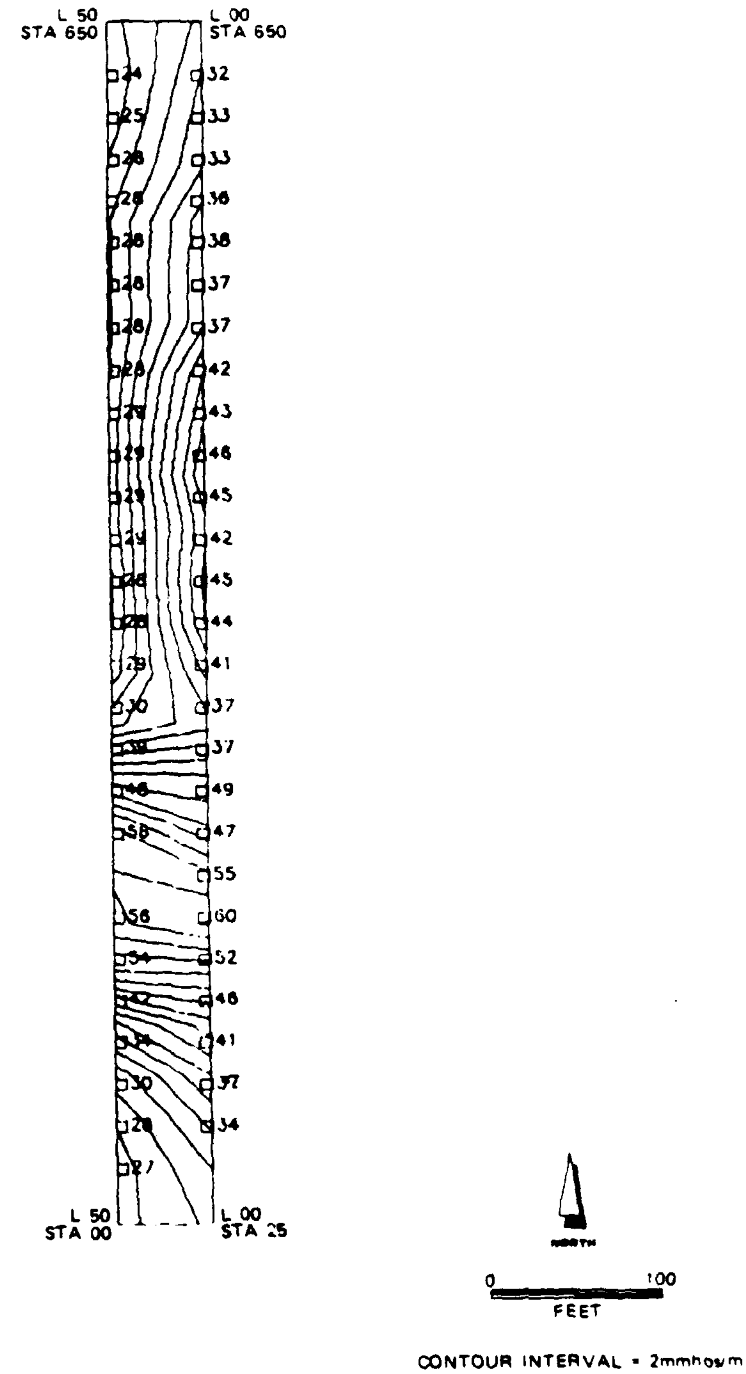
FIGURE 7



The Earth Technology Corporation

7100 AREA DISPOSAL SITE
GRID LOCATION MAP

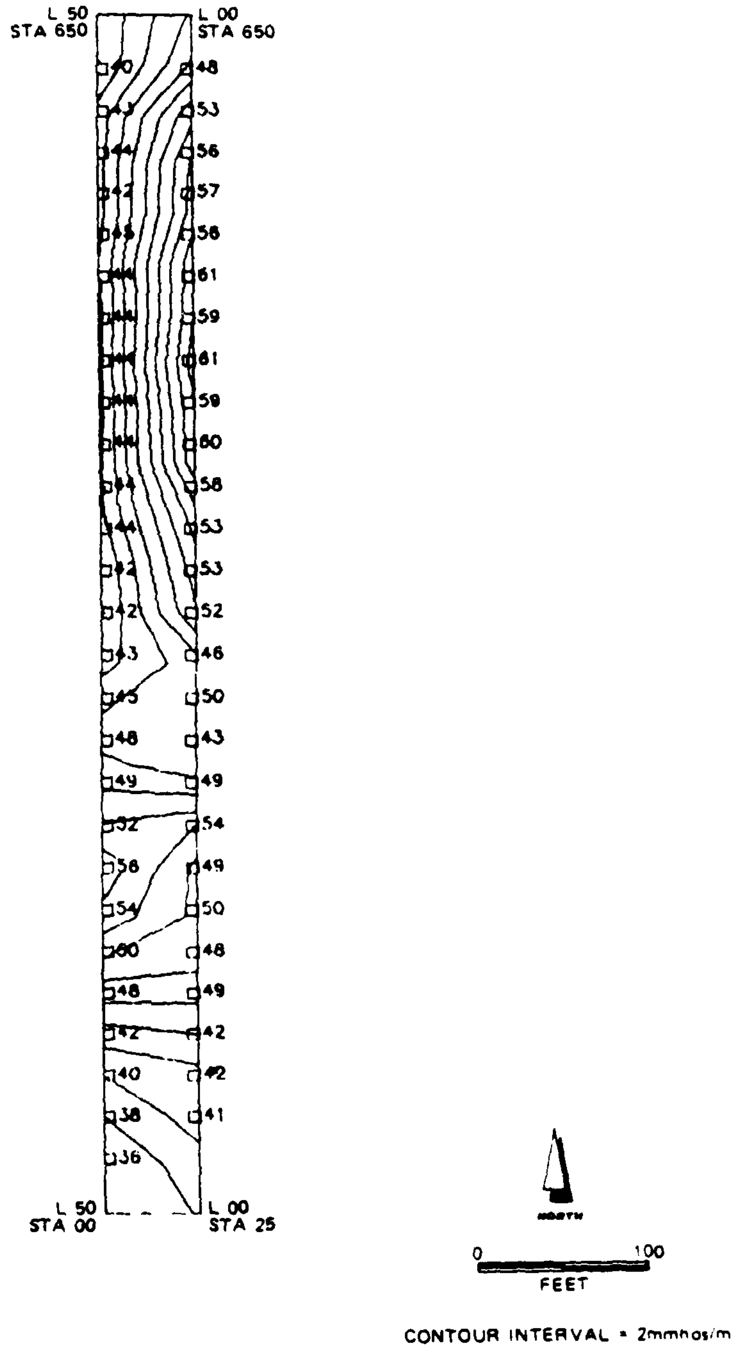
FIGURE 8



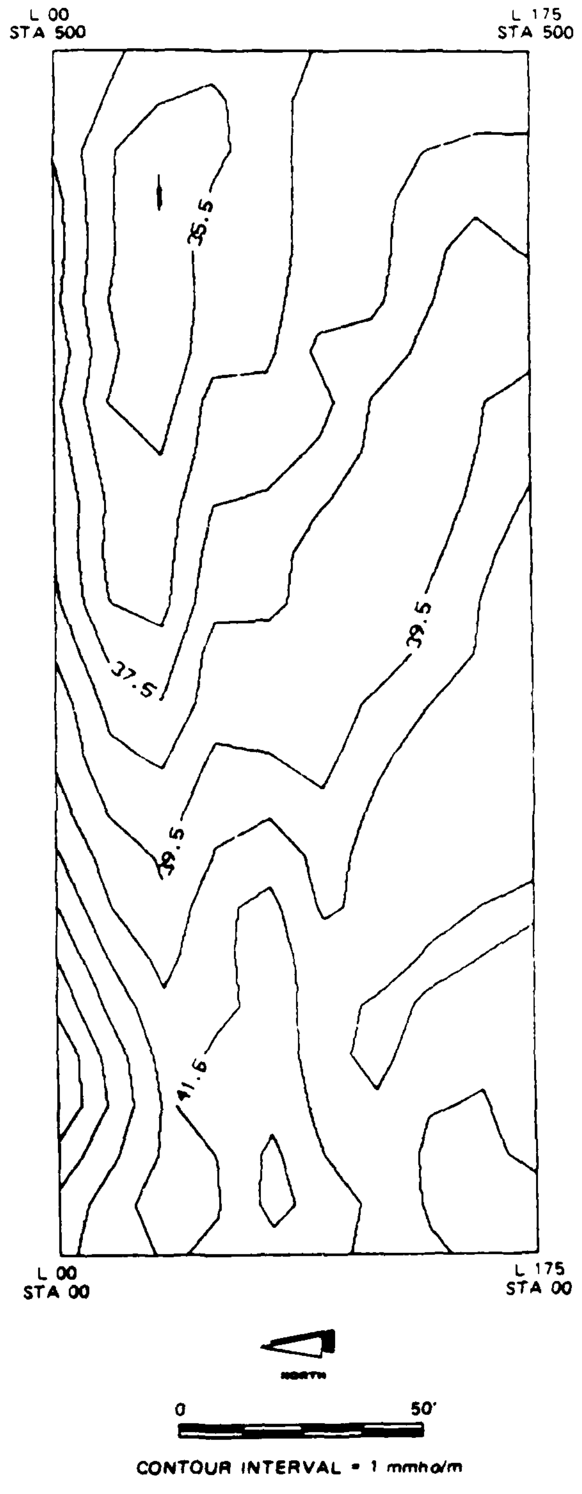
The Earth Technology Corporation

7100 AREA DISPOSAL SITE
GRID LF-2
EM-34: 10 METER SEPARATION

FIGURE
9



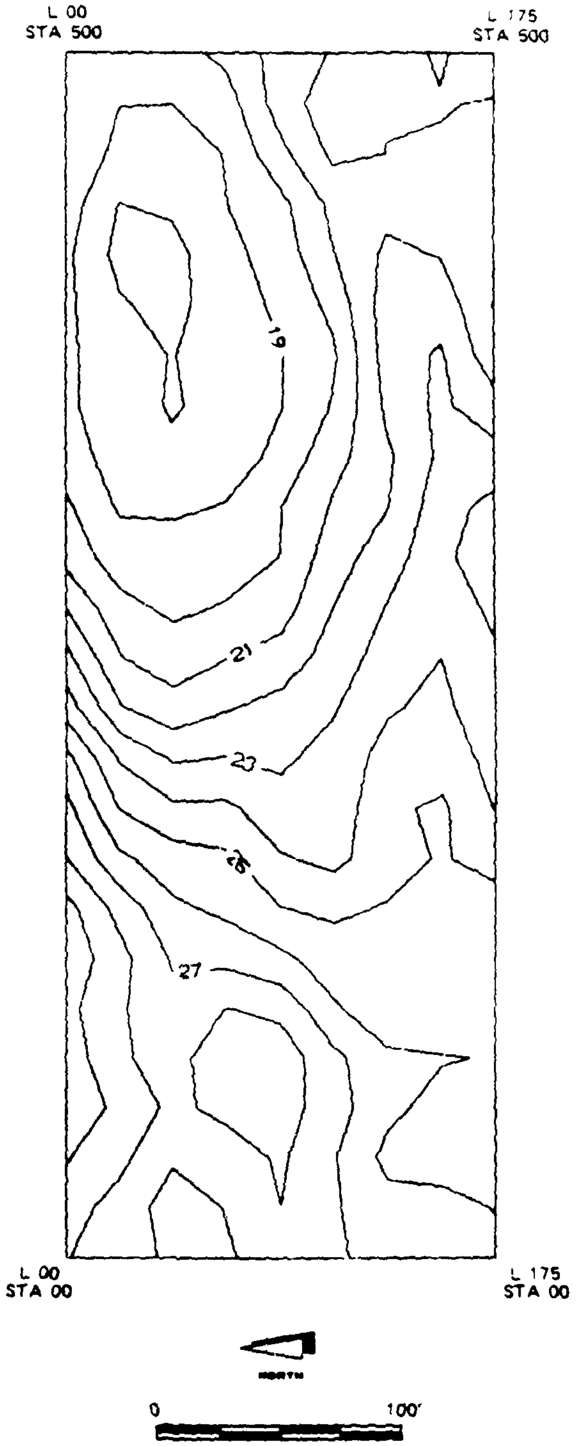
The Earth Technology Corporation	7100 AREA DISPOSAL SITE GRID LF–2 FM–34: 20 METER SEPARATION	FIGURE 10



The Earth Technology Corporation

7100 AREA DISPOSAL SITE
GRID LF-1
EM-34: 40 METER SEPARATION

FIGURE 11

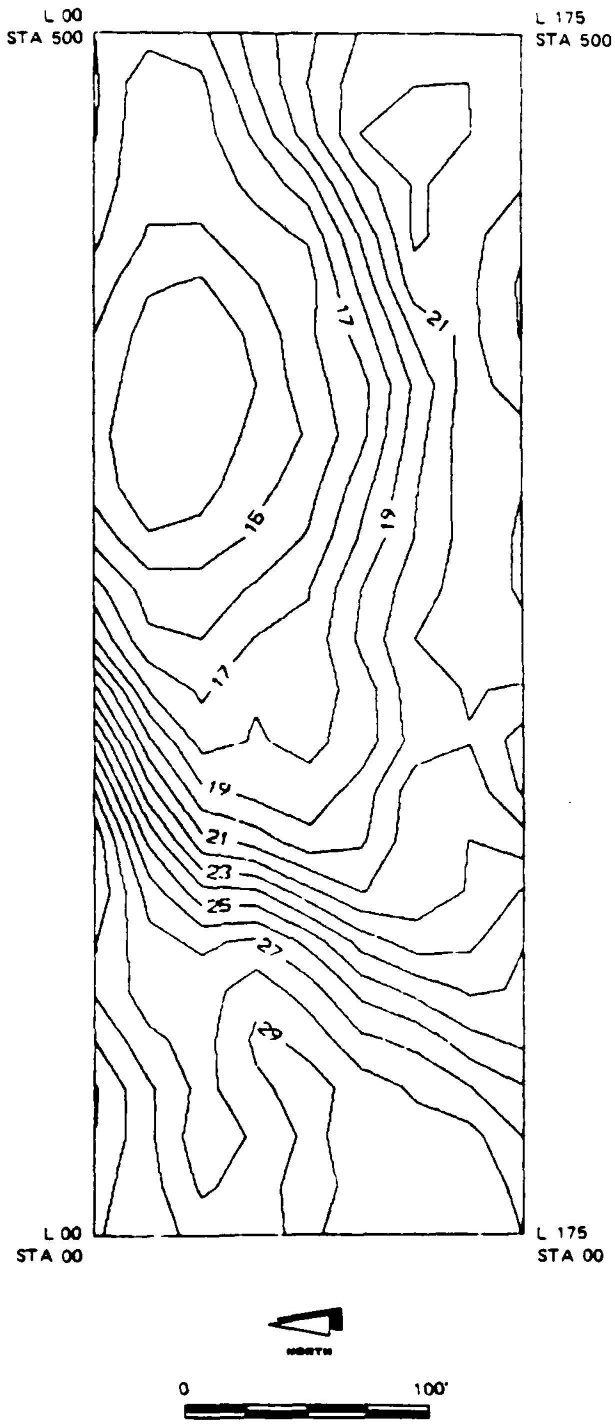


CONTOUR INTERVAL = 1 mmho/m

The Earth Technology Corporation

7100 AREA DISPOSAL SITE
GRID LF-1
EM-34: 20 METER SEPERATION

FIGURE 12



CONTOUR INTERVAL = 1 mmho/m

The Earth Technology Corporation

7100 AREA DISPOSAL SITE
GRID LF-1
EM-34: 10 METER SEPERATION

FIGURE
13

APPENDIX K

Site Safety Plan

AEROVIRONMENT INC.

Hazardous Waste Project Site Safety Plan*

Name of Site Mather AFB

Address of Site 12 miles East of Sacramento CA

Client USAF OEHL (Capt. Brian McCarty) Project No. 10416

Client's Site Contact Capt. James Curran

Plan Prepared By [illegible] O'Hara Date 6-27-86

Plan Reviewed By (AV) Doug Taylor Date 7/7/86

Plan Approved By (Med-Tox) ______ Date ______

Overall Objective of Site Visit Follow-on investigation to evaluate [illegible] sites that are known to be contaminated. Additional work at northeast perimeter and water sampling from base wells is also planned.

Proposed Date(s) of Site Visit July - Sept. 1986

Source of Information on the Site { USAF, internal documents plus [illegible] IRP research, sampling and drilling

How Old is Information? Recent day to 25 years - all sites were [illegible] and sampled (IRP Phase II Stage 1) in 1985. A summary of previous [illegible] is shown in Attachment 1.

Overall Hazard Estimation ____ High ____ Medium _✓_ Low

Sample results from Phase II Stage 1 shows water contamination but only in ppb range and no organic vapors. Low worker hazard is expected.

Physical Description of the Facility (attach map) 5798 acres in Sacramento Valley, 12 miles east of downtown Sacramento. Site includes airfield, shops, housing area and much open area.

Operational Description of the Facility The base is primarily used for navigation training. We will be investigating a waste disposal area in a landfill, a drainage ditch, and will be placing up-gradient wells along the northeast boundary of the base.

Site Status: _✓_ Active ____ Closed ____ Abandoned ____ Unknown

AV-F-HS07a

* This is the plan specific for this project. It is supplemented by the corporate health and safety plan of AeroVironment Inc. (see Attachment 2).

List the Waste(s) of Concern:

Waste	Physical State	Characteristics
SOLVENTS	LIQUID (ORIGINAL STATE AT TIME OF DISPOSAL)	TOXIC
WASTE FUEL		FLAMABLE
PLATING SLUDGE *		TOXIC
TRANSFORMER OILS *		TOXIC
PESTICIDES/HERBICIDES *		TOXIC/CARCINOGENIC

* ONLY SMALL QUANTITIES AT SITES TO BE STUDIED

Describe Potential Environmental Hazards POTENTIAL DEGRADATION OF GROUNDWATER AND SOIL QUALITY, DOWN GRADIENT GROUND WATER RECEPTORS INCLUDE BASE HOUSING AND OFF-BASE DOMESTIC WELLS

Describe Potential Worker Hazards (1) POTENTIAL EXPOSURE TO VAPORS DURING DRILLING/SAMPLING. (2) POTENTIAL DERMAL EXPOSURE TO CONTAMINATED WATER DURING WELL DEVELOPMENT AND SAMPLING. (3) DERMAL CONTACT POSSIBLE DURING SOIL SAMPLING. (4) GREATEST RISK IS FROM MECHANICAL INJURY DURING DRILLING AND WELL INSTALLATION. (5) NOISE FROM RIG COULD DAMAGE HEARING IF EAR PROTECTION IS NOT USED. OF THESE ONLY #4 AND #5 ARE CONSIDERED SIGNIFICANT RISKS, BASED ON THE RESULTS OF PREVIOUS WORK AT MATHER AFB.

ACTIVITY CONSIDERATIONS

Will site officials be with you? ____ Yes ✓ No

Is exact location of wastes: ____ Known ✓ Assumed ____ Unknown

Describe proximity of potential offsite, human receptors ON BASE HOUSING AND/OR WORK STATIONS ARE NEAR ALL SITES. WEST DITCH AREA IS WITHIN 200 FT. OF OFF BASE HOUSING (TRAILER PARK) AND BUSINESSES

List Particular Activities Planned:

Activity	Location	Date
DRILLING/WELL INSTALATION	ACW AREA, WEST DITCH,	JULY + AUGUST 1986
WELL DEVELOPMENT	7100 AREA +	
SOIL/WELL SAMPLING	NORTHEAST PERIMETER	
GEOPHYSICAL SURVEYS	ACW AREA + 7100 AREA	

AV-F-HS07b

SAFETY CONSIDERATIONS

If there is more than one level of hazard, or if there are multiple "sites" within a "site," a separate page 3 and 4 should be completed to show specific safety considerations for each location.

Work Location ACW DISPOSAL, 7100 DISPOSAL, WEST DITCH, N.E PERIMETER

Objective of Work at This Location WELL INSTALLATION AND WATER SAMPLING. GEOPHYSICAL, SOIL GAS AND SOIL SAMPLING WILL BE CONDUCTED AT ACW. (SEPARATE SAFETY PLAN WILL BE MADE FOR SOIL SAMPLING)

Level of Protection Planned: ____A ____B ____C ✓ D

Possible Modifications UPGRADE BASED ON CONTINUOUS OVM MONITORING

Surveillance Equipment:

✓ OVA (PHOTO OR FLAME IONIZATION) ✓ O_2

✓ Explosimeter

INSTRUMENT DESCRIPTIONS ARE INCLUDED ON ATTACHMENT 3. ALSO WILL HAVE FIRE EXTINGUISHERS, FIRST AID KIT AND EYE WASH STATION.

Body Coverings to be Used:

Type of Boots: STEEL TOE LEATHER; UPGRADE TO NEOPRENE IF NEEDED

Type of Gloves: LEATHER FOR DRILLERS SURGEONS GLOVES FOR SAMPLING

Type of Face Protection: SAFETY GLASSES, USE OF NEOPRENE WILL BE EVALUATED DURING DRILLING AND SAMPLING

Type of Coveralls: COTTON - TYVEX FOR SOIL + WATER SAMPLING

Additional Gear: HARD HAT + EAR PROTECTION WHEN NEAR RIG

Work Party:

Name	Responsibility	Level of Protection
HYDROGEOLOGIST	DRILLING INSPECTION, SAMPLING	D
CHEMIST/ENGINEER	SITE SAFETY - SAMPLING	D
GEOPHYSICAL CREW	SOIL GAS + GEOPHYSICAL STUDIES	D
DRILLER + CREW*	DRILLING/WELL CONSTRUCTION	D

Site Entry Procedures AS REQUIRED BY BASE PERSONNEL - CHECK IN AND OUT AT MAIN GATE DAILY. SECURITY WILL BE ADVISED OF ACTIVITIES EACH DAY

Call CAPT CURREN/MSGT SPARKS Before Entering, At (9 6) 364-2249 (Phone No.)

AV-F-HS07c

* SUBCONTRACT PERSONNEL WILL BE HELD TO THE SAME SAFETY GUIDELINES AS AN PERSONNEL, PER SUBCONTRACT.

Criteria for Changing Protection OVM READINGS >10 PPM ABOVE BACKGROUND (1)
IN BREATHING ZONE - UPGRADE TO LEVEL C, >100 PPM WILL REQUIRE SCBA.
UPGRADE TO SURGEONS AND NEOPRENE GLOVES IF NEEDED (2)
DRILLING WITH MUD ROTARY METHOD WILL SUPRESS ORGANIC VAPORS DURING DRILLING
GEOPHYSICS/SOIL GAS ARE NON-INTRUSIVE.

Decontamination Procedures STEAM CLEAN RIG AND TOOLS - SAMPLING
EQUIPMENT CLEANED WITH ALCONOX, RINSED WITH TAP WATER
AND DISTILLED WATER. NO EQUIPMENT WILL LEAVE SITE WITHOUT DECON.
ALL VEHICLES (EXCEPT DRILL RIGS) WILL BE PARKED OFF SITE. PERSONNEL DECON WILL
BE SET UP (BASED ON SITE CONDITIONS) ACCORDING TO APPROPRIATE ESTABLISHED PROCEDURES

Work Limitations (Time of Day, etc.) AS REQUIRED BY BASE PERSONNEL
CARE WILL BE GIVEN DURING HOT DAYTIME HOURS TO AVOID HEAT STRESS
ESPECIALLY IF AIR PURIFYING RESPIRATORS ARE NEEDED THE SITE SAFETY
OFFICER WILL BE RESPONSIBLE FOR MONITORING FOR VISUAL SIGNS OF HEAT STRE
AIR CONDITIONING AND WATER/LIQUIDS WILL BE AVAILABLE FOR ALL FIELD WORKER

Disposal of Disposable Materials, Drill Spoils, Decontaminated Water, etc.
SOIL AS DIRECTED BY BASE PERSONNEL - IF NOT CONTAMINATED.
CONTAMINATED SOIL WILL BE DRUMMED AND KEPT ON-SITE.
WATER WILL BE LEFT AT THE WELLHEAD.

Location of Nearest Phone MOBILE PHONE AT SITE

Nearest Water WATER AT SITE - SUFFICIENT FOR DRINKING, WASHING, + FIRE PROTECTION

Public Road WHITHER FIELD ROAD

Provide Site Sketch (with all relevant facilities)

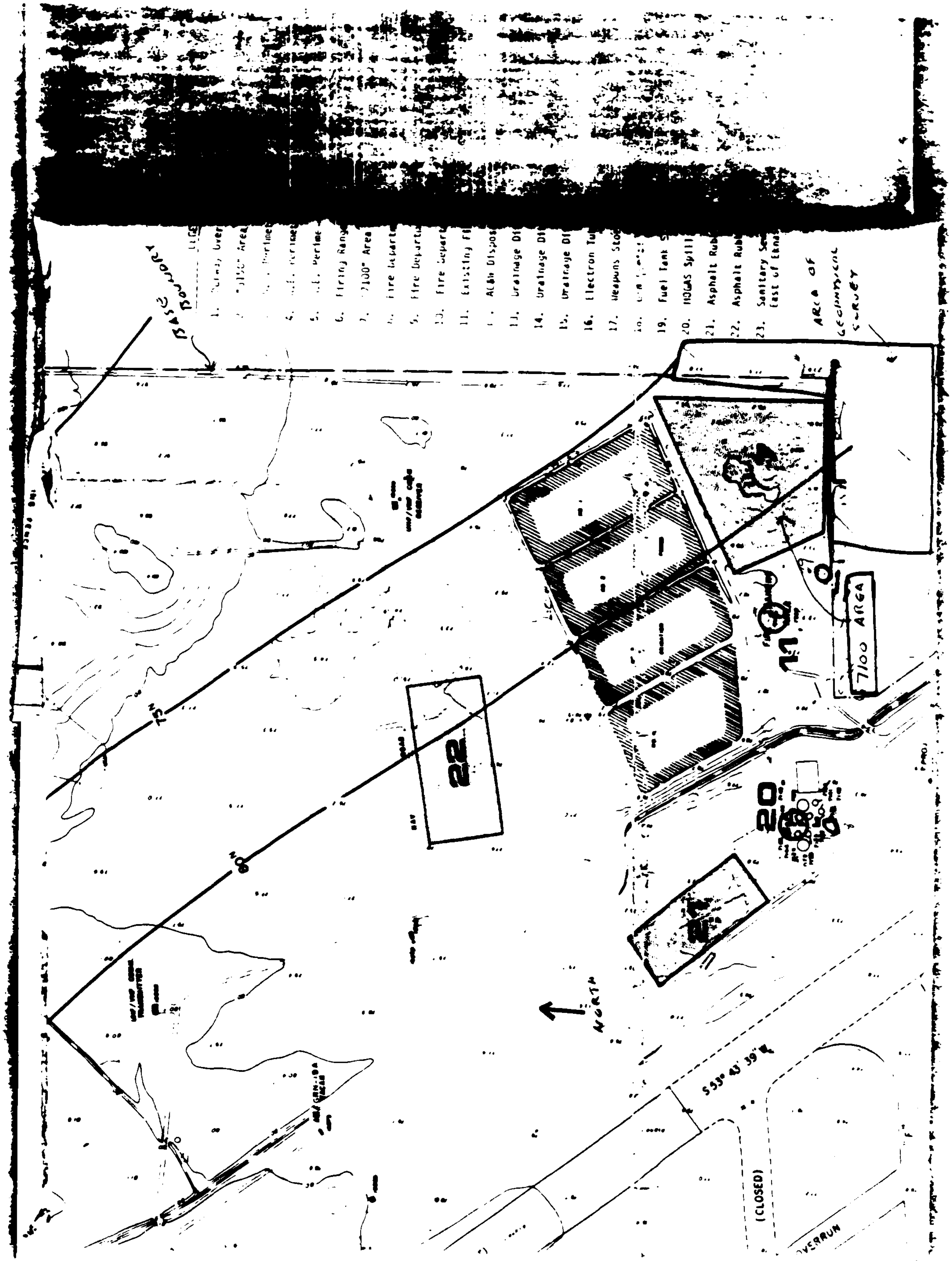
SEE ATTACHED MAP

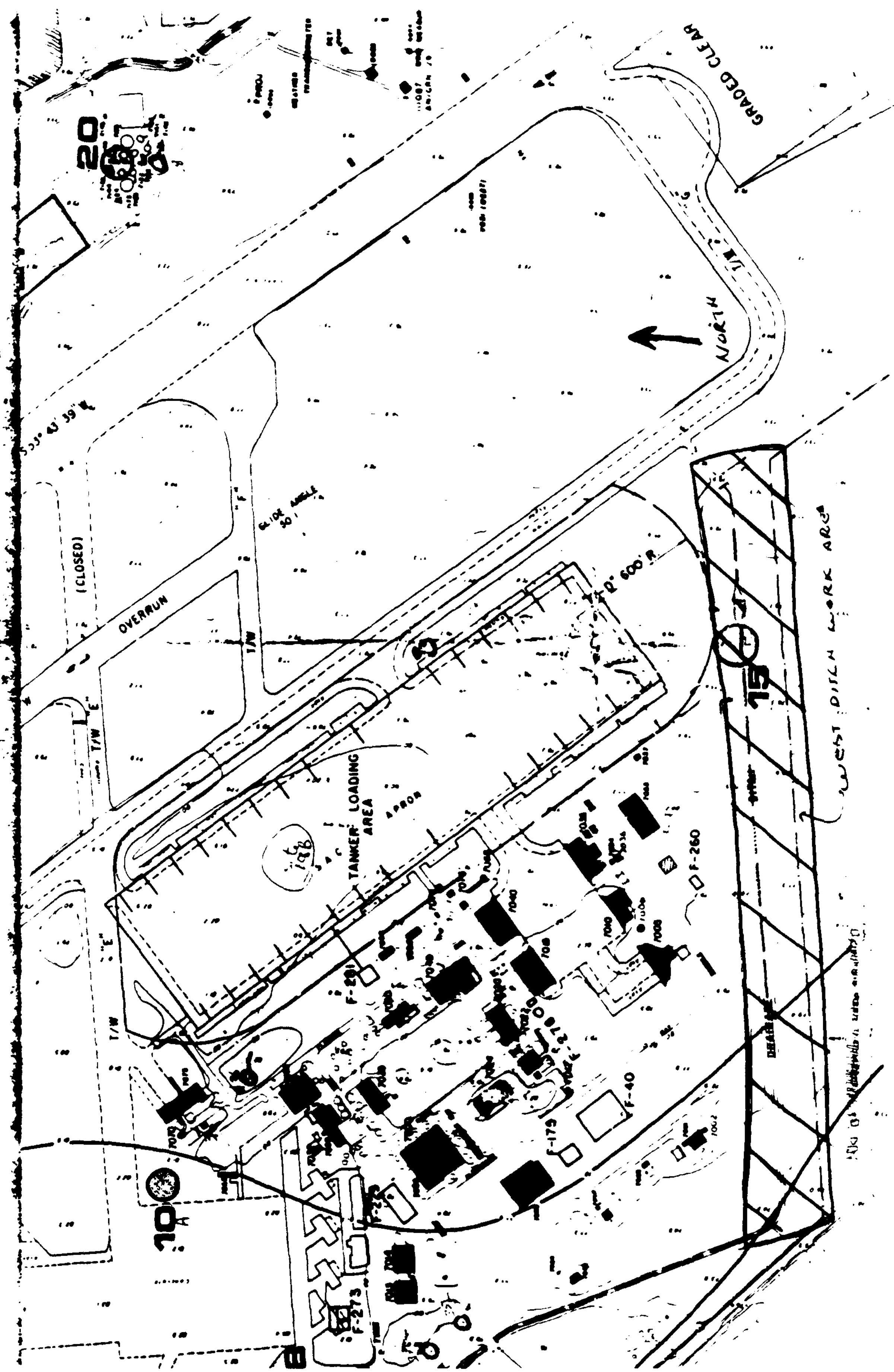
(1) AT OR BELOW THE PERMISSIBLE EXPOSURE LIMITS (CAL OSHA) FOR THE 3 PRIMARY CHEMICALS FOUND DURING PHASE II STAGE 1 SAMPLING

PEL's:
TCE 25 PPM
PCE 50 PPM
1,1DCE 10 PPM
(MONITORING FOR BREATHING ZONE CONC. WILL BE CONTINUOUS).

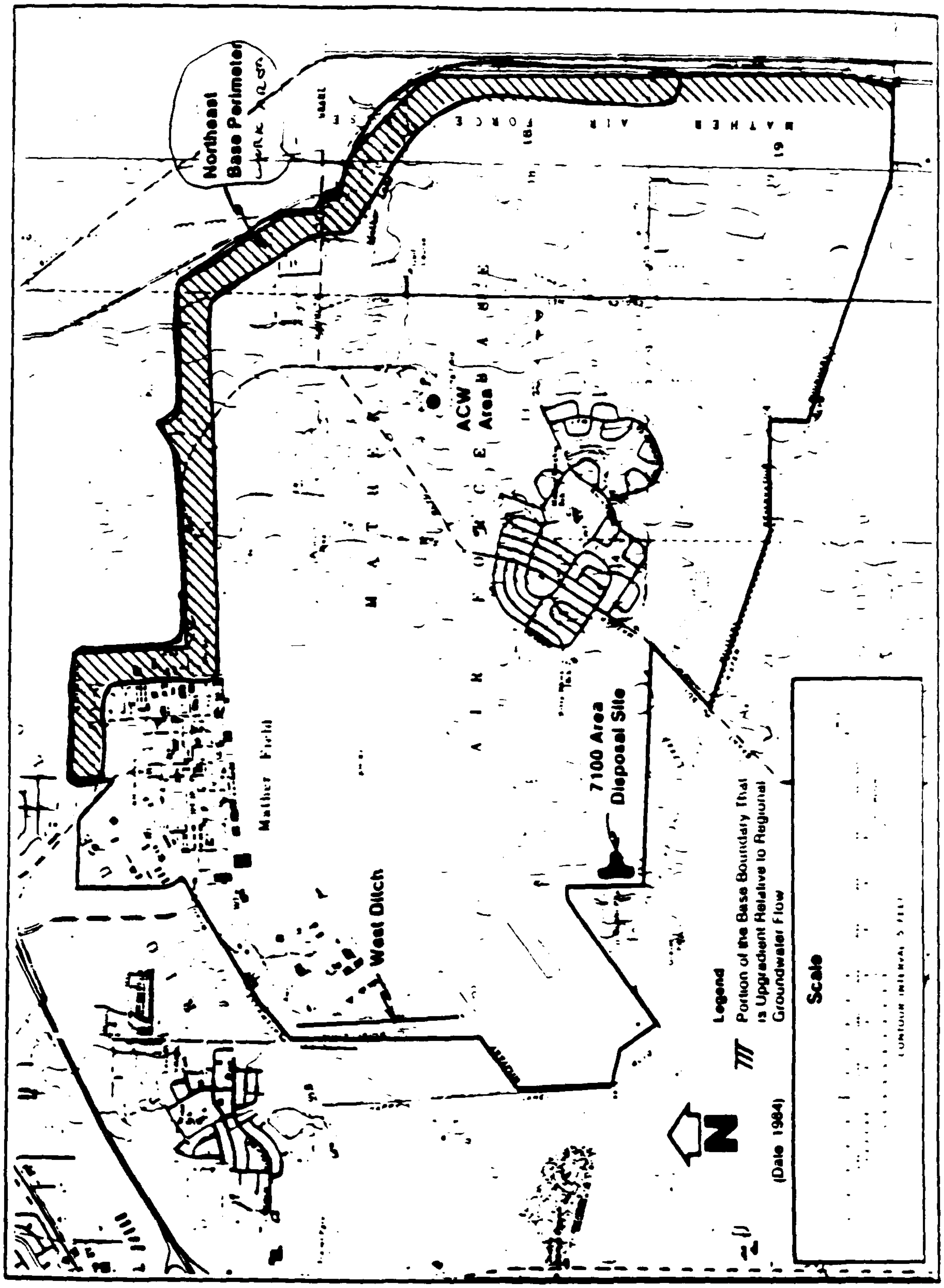
(2) CRITERIA FOR UPGRADING TO NEOPRENE BOOTS AND GLOVES WILL BE ANY OVM READING ABOVE BACKGROUND AT THE BOREHOLE OR MUD PIT. MONITORING AT THESE LOCATIONS WILL ALSO BE CONTINUOUS

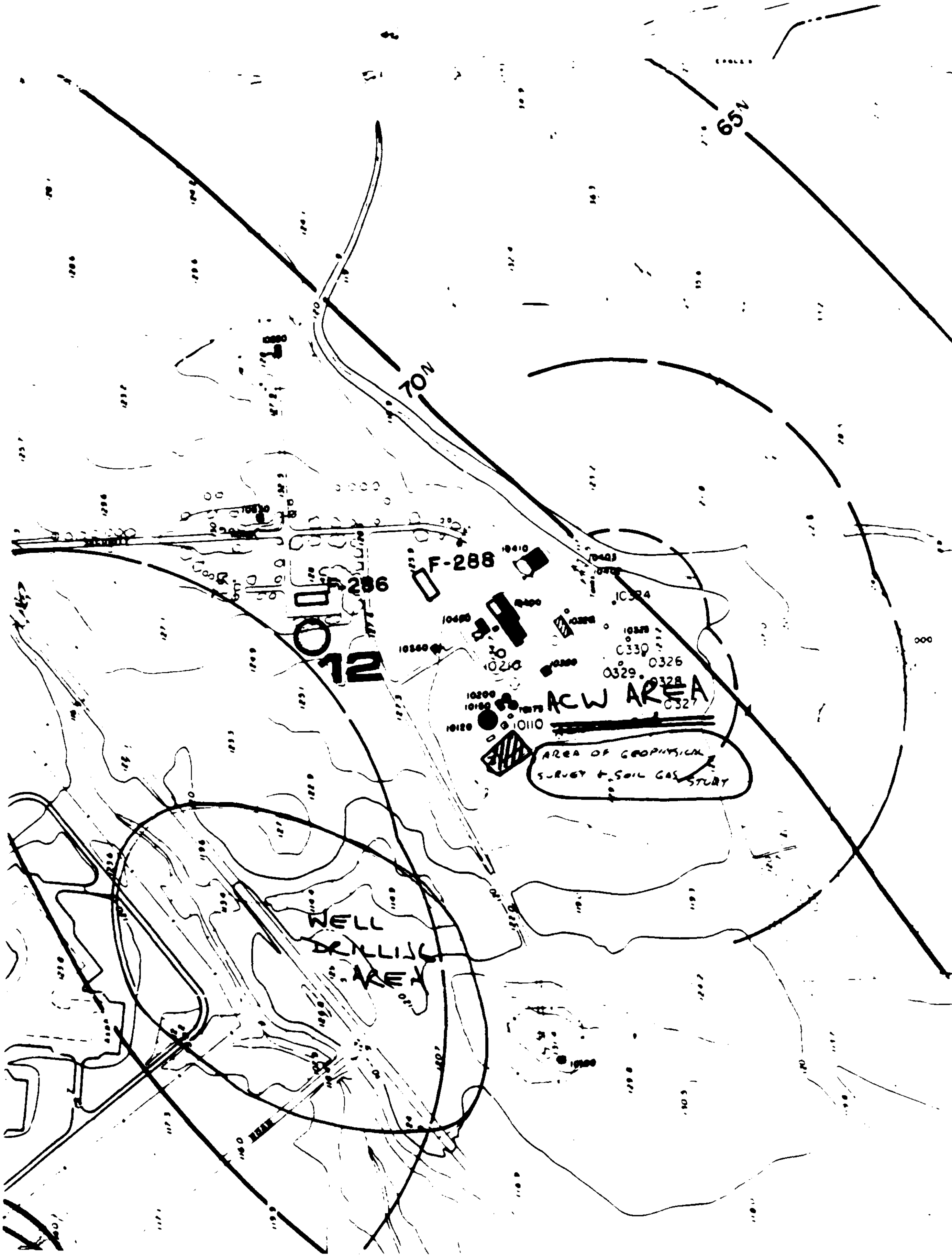
AV-F-HS07d


BASE BOUNDARY
ARCA OF GEOPHYSICAL SURVEY
7100 AREA
22
20
21
11
NORTH
S 53° 43' 39" W
(CLOSED)
OVERRUN



GRADED CLEAR
NORTH
OVERRUN
(CLOSED)
T/W
TANKER LOADING AREA
APRON
WEST DITCH WORK AREA
F-260
F-40
F-173
F-273
20
15
10


Northeast Base Perimeter
Mather Field
West Ditch
ACW Area 6
7100 Area Disposal Site
Legend
Portion of the Base Boundary That is Upgradient Relative to Regional Groundwater Flow
Scale
(Date 1984)
N


65N
70N
F-288
F-286
12
ACW AREA
AREA OF GEOPHYSICAL SURVEY + SOIL GAS STUDY
WELL DRILLING AREA

EMERGENCY PLANNING

Phone Numbers

Credit Card	557-133-2513-4343
Local Police	364-2314
Local Ambulance	364-3333 (EMER.) OR 364-3213
Local Fire Dept.	364-4100 (MAIN BASE) 362-1396 (HOUSING AREA)
Local Hospital	364-3333
Local Airport	
Client Contact	1-800-821-4528 (BROOKS AFB) (916) 364-2284 (MATHER AFB) 364-4834

Is there a phone at the site? YES If yes, number WILL RENT MOBILE TELEPHONE
(Report this number with your supervisor and receptionist before leaving for the field)

Emergency Phone Numbers

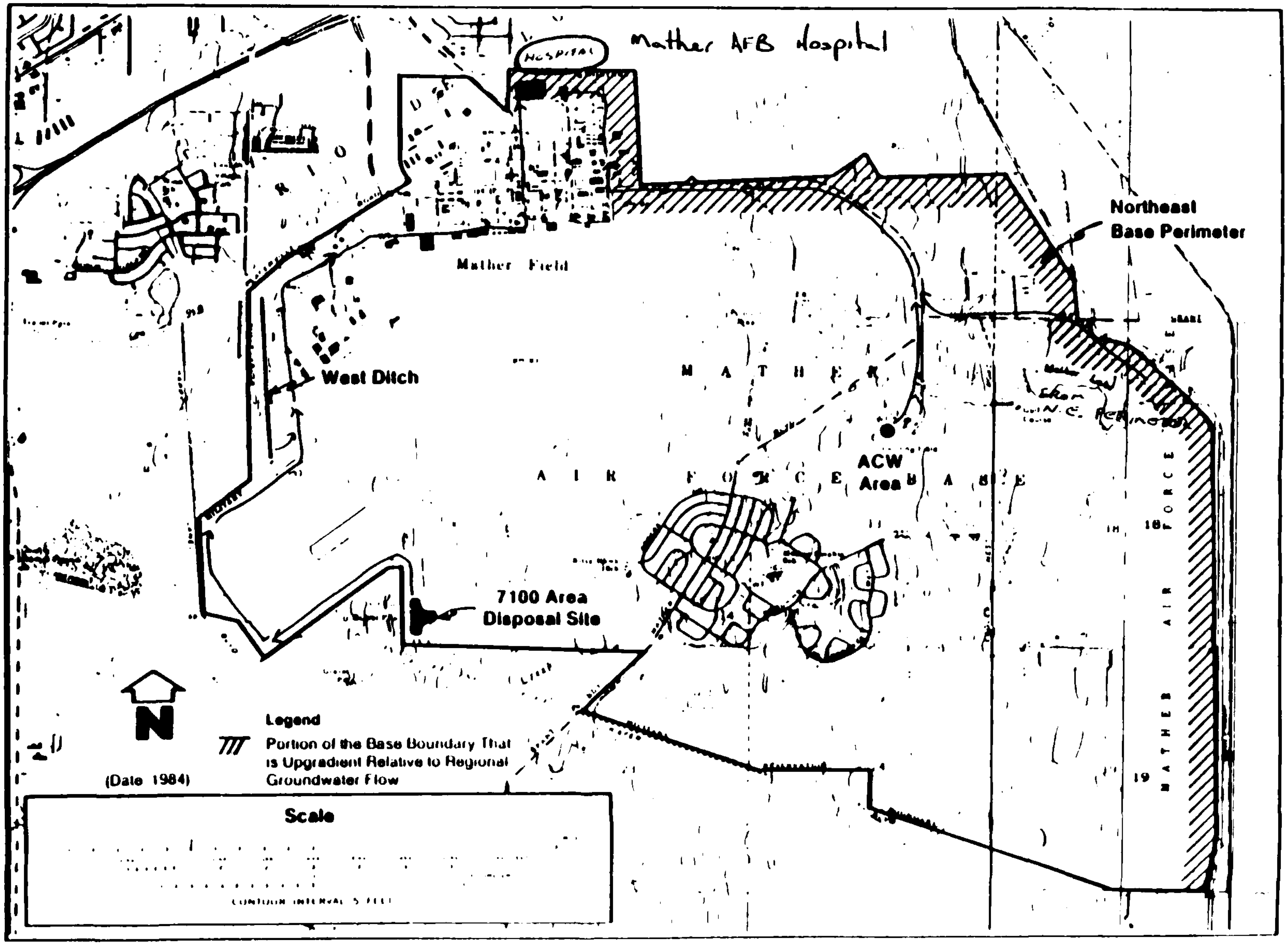
AeroVironment Office	357-9983 (818) [redacted]
Home of CHS* Officer	(213) 259-9934
Director, Env. Programs	(818) 799-6486
V. P. Env. Serv. Div.	(818) 794-6126
Exec. V.P.	(818) 799-6572
Company Physician	
Med-Tox Consultants	(714) 669-0620
Subcontractor's Office	(714) 870-5360 - DRILLER

Hospital Route (attach map with route highlighted):

Provide directions to nearest available medical facility: SEE ATTACHED

*Corporate Health & Safety

AV-F-HS07e



Routes to Hospital

ATTACHMENT 1

PREVIOUS FINDINGS

SUMMARY OF PREVIOUS FINDINGS
MATHER AFB, CA

PHASE I, STAGE 1

• ACW DISPOSAL AREA

3 WELLS WERE DRILLED USING MUD ROTARY METHODS, ALL DOWN-GRADIENT

SAMPLED IN MAY 1985 AND JUNE 1985

RESULTS:

MAFB-1	TCE	8/460 ppb
	Benzene, Toluene	Trace levels
MAFB-2	TCE	13/36 ppb
MAFB-3	TCE	27/33 ppb

• 7100 AREA

3 WELLS, DOWN-GRADIENT, MUD-ROTARY

RESULTS

MAFB-7	NO REPEATABLE RESULTS	
MAFB-8	TCE	87/100 ppb
	PCE	5/20 ppb
	Chlorobenzene	1/3 ppb
	Dichlorobenzene	Trace
MAFB-9	TCE	4/5 ppb
	PCE	1/1 ppb

• WEST DITCH AREA

2 WELLS, DOWN-GRADIENT, MUD-ROTARY

NO SIGNIFICANT RESULTS

- NORTHEAST PERIMETER

  3 WELLS, UP-GRADIENT, AND OTHER

  NO SIGNIFICANT RESULTS

THROUGHOUT THE DRILLING PROGRAM, NO ORGAN VAPOR READINGS WERE MADE ABOVE BACKGROUND. NO OTHER HEALTH / SAFETY PROBLEMS WERE IDENTIFIED.

PHASE II, STAGE 2

OTHER SITES WERE STUDIED. A SERIES OF WELLS WERE INSTALLED USING AIR ROTARY W/ CASING HAMMER.

- WATER SAMPLING RESULTS ARE NOT YET AVAILABLE.
- NO ELEVATED OVM READINGS WERE MADE DURING THE DRILLING OF ANY OF THE WELLS.
- HOLLOW STEM AUGERING WORK WAS DONE, ALSO WITHOUT ELEVATED OVM READINGS.

PHASE I, RECORD SEARCH

ONLY SOLVENTS AND FUELS ARE REPORTED AT ANY SITES. NO PCBs, DIOXINS, METAL SLUDGES OR SIGNIFICANT PESTICIDE / HERBICIDE

ATTACHMENT 2

EXECUTIVE SUMMARY

AV-OP-84 527

AEROVIRONMENT INC.

CORPORATE HEALTH

AND

SAFETY PLAN

August 1984

AeroVironment Inc.

145 VISTA AVENUE - PASADENA, CALIFORNIA 91107 USA

(818) 449-4392

EXECUTIVE SUMMARY

AeroVironment (AV) has prepared this Corporate Health and Safety Plan (CHSP) to help provide for the safe completion of AV field programs at known or suspected hazardous work locations. Primarily, this plan is intended for workers and managers involved in AV's hazardous waste projects. However, it also applies to any project which involves above-average risks from chemical exposure or respiratory hazards. The plan describes the procedures the company takes to minimize the risk to workers, the company and its clients. A Corporate Health and Safety Officer has been selected to oversee and implement this plan.

The company's employees have been assigned to one of three safety categories according to the type of field projects they will work on. Training, respiratory protection, recordkeeping and medical examination requirements have been set up for each of the two participant categories. Planning is done before each field program to determine if there are hazardous environmental conditions at the proposed work location or if the work assignments will require handling or sampling hazardous wastes or materials. If special safety planning is appropriate, this CHSP will be implemented on that project. Only properly trained employees will be assigned to field jobs where potential chemical hazards exist. A specific safety plan will be prepared for each potential hazardous site. It will be prepared to provide specific actions which will be used at that site to comply with this overall plan.

The company's policies, procedures and standards pertaining to hazardous field work are described in Section A. This includes a description of how the plan is to be implemented into specific AV projects and proposals. Section B describes the general safety requirements of the plan. Industrial hygiene considerations are described in Section C. This includes a brief review of necessary worker protection from harmful chemicals and waste materials. Sections D, E, F and G describe the four key elements of the Corporate Health and Safety Plan: Medical Monitoring requirements, Respiratory Protection plan, Training requirements and Recordkeeping functions. The Corporate Health and Safety Officer is responsible for implementing these four elements of the CHSP directly or through Med-Tox Associates, Inc.

The general plan is supported by numerous standard procedure documents which describe in more detail the methods which should be used to properly implement the CHSP. Specific guidance on the company policy, plan implementation, worker rights and responsibilities and program objectives should be sought from the Corporate Health and Safety Officer.

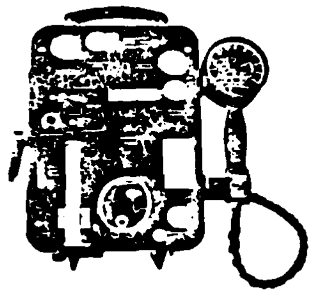
ATTACHMENT 3

INSTRUMENT SPECIFICATIONS

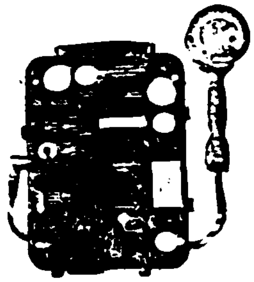
The OVA128 and OVA108 Series CENTURY Portable Organic Vapor Analyzers provide continuous direct readout of total organic vapor concentration for screening and survey purposes (Mode 1), and qualitative and quantitative analyses using the gas chromatograph option (Mode 2).

Ordering Instructions – Specify

1. Model Number
2. Accessories from Page 2



OVA128



OVA108

Standard Specifications

Readout:
OVA128: 0 to 10, 0 to 100, and 0 to 1000 parts per million (ppm) linear scales
OVA108: 1 to 10 000 ppm, logarithmic scale

Minimum Detectable Limit (Methane):
OVA128: 0.2 ppm
OVA108: 1 ppm

Response Time: Approximately 2 seconds

Fuel for Detector: Hydrogen

Carrier Gas for Chromatograph: Hydrogen (self-contained tank)

Sample Flow Rate: Approximately 1 litre per minute

Concentration Alarm: Audible, user selectable level

Internal Calibration:
OVA128: No
OVA108: Yes, 2 point

Electrical Power: 12 V, rechargeable battery

Voltage Output to Recorder: 0 to 5 V dc

Flameout Indication: Audible and visual

Service Life in Portable Mode: 8 hours

Filters: Sintered metal, user cleanable

Printed in U.S.A.

Model and PRICE

Model and Description	Model	PRICE
OVA = CENTURY Portable Organic Vapor Analyzer. Includes sidepack, tool kit, probe/readout, battery charger, hydrogen filler hose, shoulder strap, probes, earphone, manual, and carrying case.	OVA	5200
Readout:		
128 = Linear scale, 0 to 10, 0 to 100, and 0 to 1000 ppm	128	Net
108 = Logarithmic scale, 1 to 10 000 ppm	108	Net
Type:		
-A = Basic flame ionization detector for total hydrocarbons monitoring.	-A	Net
-B = Gas chromatograph. Includes 2 chromatograph columns (a G-24 and a T-12), injection valve, backflush valve, charcoal filter, and plumbing.	-B	Add 1125-
-C = Tri-Column, for benzene analysis. For OVA128 Series only. Includes a stripper column, T-24 analytical column, charcoal waste collector, injection valve, backflush valve, charcoal bypass filter, and plumbing.	-C	Add 1350-
Battery Charger:		
1 = 120 V, 60 Hz	1	Net
2 = 220 V, 50 Hz	2	Net
3 = None	3	Refer to Foxboro
Classification:		
E = FM certified. For use in Class I, Groups A, B, C, and D, Division 1 hazardous environments.	E	Net
F = BASEEFA certified. Ex. ib. s IIC T4 BASEEFA No. 76002/B std. SFA 3007.	F	Net
Optional Features:		
Strip chart recorder.		
-A = FM certified	-A	Add 440
-B = BASEEFA certified	-B	Add 440

® Registered Trademark

The Model 580 Portable Organic Vapor Meter has been designed primarily as an industrial hygiene safety tool. Its applications, however, extend to the entire environmental area as well as such diverse uses as leak testing and leak sourcing.

features

Portability

The Model 580 Portable Organic Vapor Meter is a self-contained system requiring no external services. The instrument will operate in the field off of its own internal battery pack for at least 8 hours. Its light weight makes for very easy transportation.

Linear Dynamic Range to 2000 ppm

Because of the large dynamic range required in the measurement of organic vapors in ambient air and the work environment, special care was taken in the design of the Photoionization Detector to ensure adequate linearity for these measurements. The Photoionization Detector design has a linear range from 0 to 2000 ppm with a minimum detectable of .1 ppm on the 0 to 200 ppm scale. This wide dynamic range is conveniently displayed by the digital readout and is a significant improvement on other instruments in the field.

Photoionization Detector

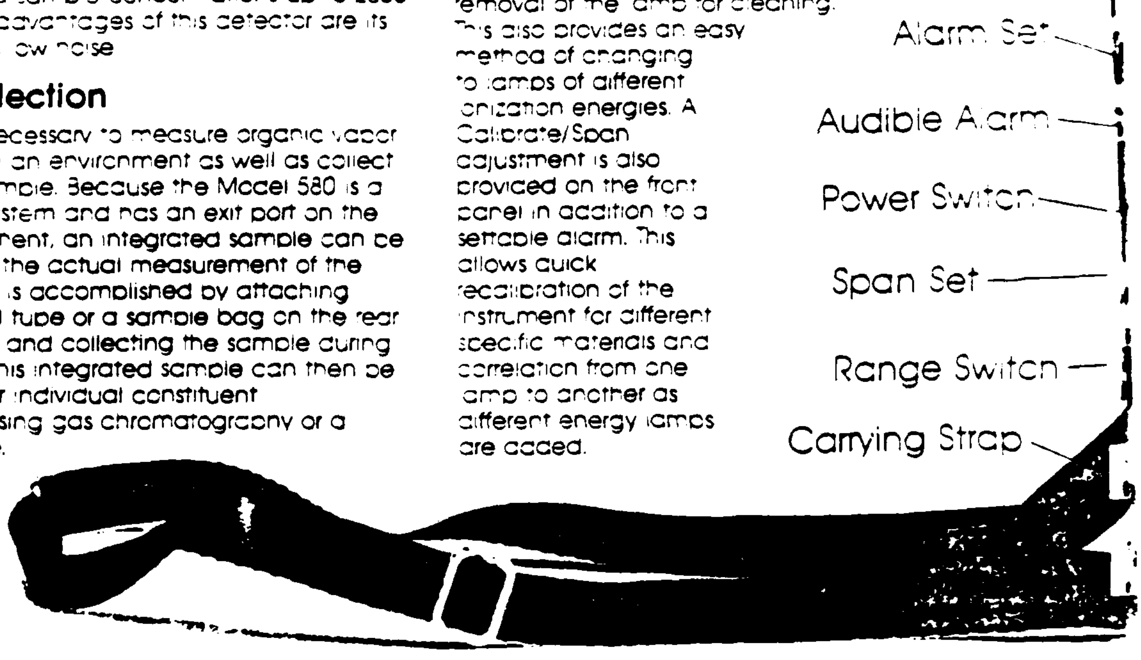
The principle of detection for the Model 580 is Photoionization, which provides high sensitivity for most organic vapors and some inorganic materials. The detector has a minimum detectable of .1 ppm and can measure sample concentrations up to 2000 ppm. Additional advantages of this detector are its high stability and low noise.

Sample Collection

It is quite often necessary to measure organic vapor concentrations in an environment as well as collect an integrated sample. Because the Model 580 is a nondestructive system and has an exit port on the rear of the instrument, an integrated sample can be collected during the actual measurement of the environment. This is accomplished by attaching either a charcoal tube or a sample bag on the rear of the instrument and collecting the sample during measurements. This integrated sample can then be analyzed later for individual constituent concentrations using gas chromatography or a similar technique.

Operator Designed

The Model 580 was designed with the operator in mind. Utilizing a liquid crystal display, the concentration readout can be made in dark areas as well as bright sunlight. The detector was designed with quick and easy removal of the lamp for cleaning. This also provides an easy method of changing to lamps of different ionization energies. A Calibrate/Span adjustment is also provided on the front panel in addition to a settable alarm. This allows quick recalibration of the instrument for different specific materials and correlation from one lamp to another as different energy lamps are added.



principals of operation

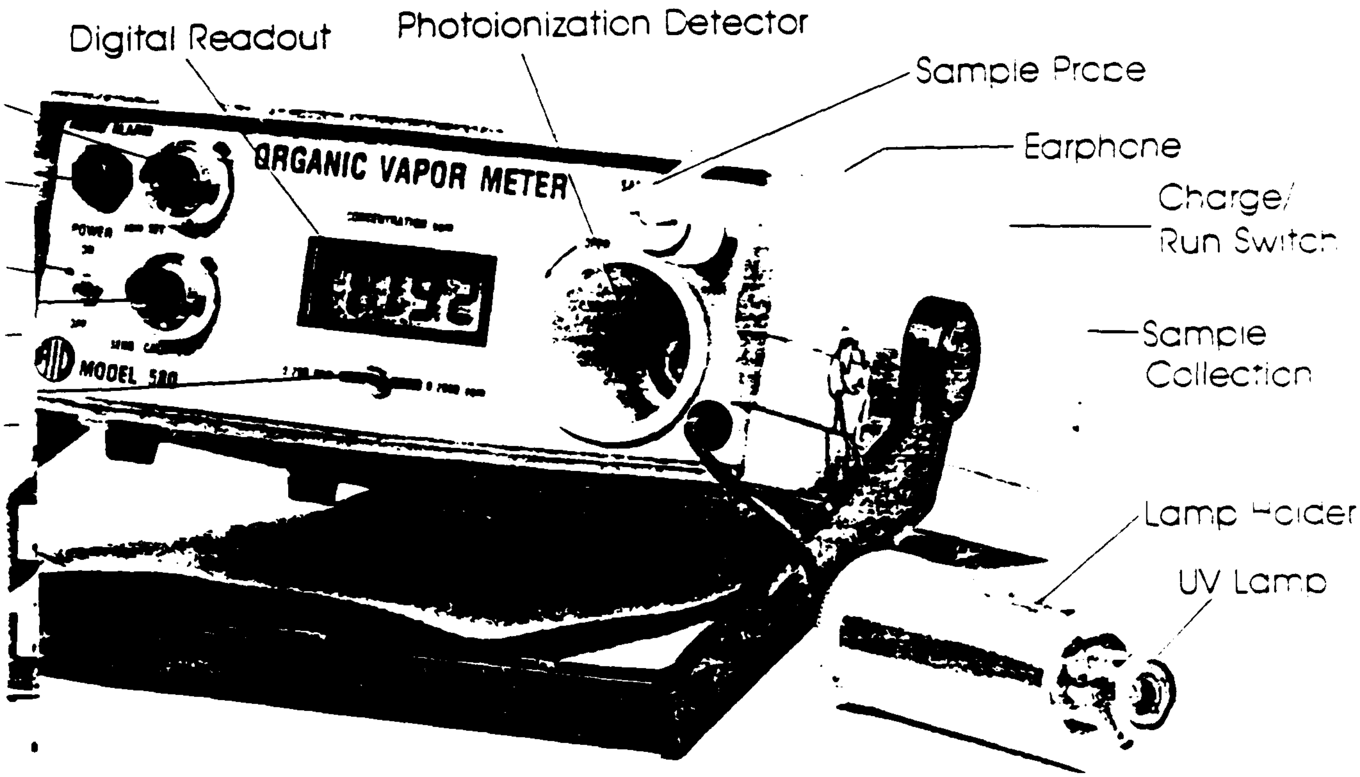
model 580

The Photoionization Detector utilizes a high energy ultra-violet lamp to ionize the sample which is drawn into the instrument. The ionized sample produces an ion current which is proportional to concentration and is measured with a pico ammeter.

The ionization is a fundamental process. A photon of light from the UV source energizes an electron of the sample molecule producing an ionized species and a free electron:

$$R + h\nu \rightarrow R^{+} + e^{-}$$

For this reaction to occur, the photon energy (hv) must be equal to or greater than the ionization potential of the sample molecule. In general, the PID will respond to most organic compounds. It is insensitive to methane, ethane, and most of the permanent gases. This insensitivity to materials normally found in ambient air makes the PID a selective device and an invaluable instrumental tool.



specifications

Measurement

Technique	Photoionization Detection of most organic vapors and some inorganic gases
Ranges	Digital Readout LCD 0-200 ppm, resolution to 0.1 ppm 0-2000 ppm Recorder Output 1 mV/ppm or 0.1 mV/ppm range dependent
Minimum Detectable	0.1 ppm benzene in air matrix
Sensitivity	0.1 ppm benzene on 0-200 ppm scale
System Time Constant	[illegible] sec at maximum sample flow
Sampling Rate	Nominal Flow 500 ml/min
Sample Conditioning	Optional Particulate Filter Available — Option 01

Power Requirements

Battery	Internal, Rechargeable, Charger provided
Service Life	8 hours per internal battery charging; external 12V battery available; operates from charger indefinitely
Charger Requirements	115/220 VAC, 50/60 Hz, 4 watts maximum

Controls, Panel

Readout	Digital display
Calibration	Zero adjust with zero air, Span adjusted with span gas
Alarm	0-200 ppm with resolution to 1 ppm
Power	Power selection for instrument Charge AC, On Battery, Run

Other Features

Audible Alarm	[illegible]
[illegible]	[illegible]

Physical

Case size	Bench mount [illegible]
Weight	[illegible]

applications

The Model 580 is so sensitive and versatile an instrument that its applications are only limited by the imagination of the operator. Below are listed several obvious applications for the instrument. Other applications certainly can be developed as need dictates. For example, the instrument may be used as a leak detector or a technique for locating [illegible] in a storage area, etc.

Industrial Hygiene Monitoring

Because of the increasing complexity of organic exposure to the worker in his work environment, it becomes more and more important that a complete understanding of the exposure levels be maintained. The Model 580 can easily be moved throughout a work area to measure the different organic vapor concentrations in different locations and at different times. This type of record is invaluable in developing an understanding of worker exposure and evaluating efficiency of the exhaust system.

Total Sample Collection

At the same time the area is being monitored and measured, an integrated sample can be collected by placing a charcoal tube or a gas sampling bag on the rear of the 580. The Photoionization Detector is a nondestructive detector and as a result does not modify or change the chemical character of the sample being collected. This unique feature will allow one to perform an analysis of the individual components of the total sample at a later date. Knowing both the concentration of the total sample and the individual constituents, the chemist is armed with very profound data which will aid in understanding worker exposure.

Environmental Surveys

With the increasing emphasis on the environmental problems, especially landfills, it is important to realize that there is an instrument available that has sufficient sensitivity to measure very low concentrations of organic materials that may be seeping from the earth's surface. This type of use, in addition to just basic ambient air monitoring, makes the 580 a very effective tool both in the work environment and at the ambient air levels where the concentrations are exceedingly low.

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TABLE 1.

FOXBORO CENTURY 128GC OVA
RELATIVE RESPONSE FACTORS BASED ON METHANE

COMPOUND	RELATIVE RESPONSE
METHANE	1
TCE	0.7
TCA	1.05
TRANS-1,2-DCE	0.5
PCE	0.7
BENZENE	1.5
TOLUENE	1.1
m-XYLENE	1.11

THE FLAME IONIZATION DETECTOR WILL RESPOND TO MOST ORGANIC COMPOUNDS, ESPECIALLY NON-SUBSTITUTED HYDROCARBONS. IT IS ALSO RELATIVELY SENSITIVE TO HALOGENATED HYDROCARBONS. SENSITIVITY DECREASES FOR OXYGEN AND NITROGEN-CONTAINING COMPOUNDS. THE INSTRUMENT IS CALIBRATED USING METHANE AS THE CALIBRATION GAS, AND THE RELATIVE RESPONSE FACTORS (FROM TABLE 1) ARE APPLIED TO ACTUAL FIELD MEASUREMENTS.

TABLE 2.

AID MODEL 580 ORGANIC VAPOR METER (PID)
RELATIVE RESPONSE FACTORS BASED ON BENZENE
PHOTOIONIZATION POTENTIALS

COMPOUND	PHOTOION. POTENTIAL	RELATIVE RESPONSE
ACETONE	9.69	0.452
BENZENE	9.25	1
DIETHYL AMINE	8.01	0.509
MEK	9.53	0.1
PROPYLENE	9.73	0.454
TOLUENE	8.82	0.814
TCE	9.45	0.734
m-XYLENE	8.56	0.9

THE AID 580 HAS A 10 eV UV SOURCE. THE DETECTOR WILL RESPOND TO COMPOUNDS HAVING PHOTOIOIZATION POTENTIALS OF 10 eV OR LESS. THE INSTRUMENT IS VERY SENSITIVE TO AROMATIC AND UNSATURATED ORGANICS AND AMINES. METHANE AND SATURATED C2-C5 HYDROCARBONS CANNOT BE DETECTED USING THIS INSTRUMENT.

APPENDIX L

Daily Activity Log

o Drilling and Well Installation

Thursday, July 30, 1986. The field geologist met with representatives of the USAF and the California Regional Water Quality Control Board to stake well sites on base.

Friday, July 31, 1986. The field geologist finished staking the groundwater monitoring well sites and conducted a records search on base.

Wednesday, August 13, 1986. The drilling crew from Beylik Drilling Company met with the field geologist to review the sites and set up their equipment on base.

Thursday, August 14, 1986. A representative of DOHS TOXICS was on base to check the well sites. The drilling crew was still preparing to drill.

Friday, August 15, 1986. The drilling crew started drilling Well 43 at the 7100 Landfill. Drilling was hindered by the geology in the area and stopped at a depth of 30 feet.

Saturday, August 16, 1986. Well 43 was drilled to a depth of 141 feet and an E-log was run.

Sunday, August 17, 1986. Perforated casing was set from 108 to 128 feet at Well 43. It was then gravel packed and grouted to ground surface.

Monday, August 18, 1986. Drilling rig down due to electrical problems. The geophysical crew toured the sites to be used for the EM survey at the 7100 Landfill area and the ACW site.

Tuesday, August 19, 1986. Well 44 was drilled to 58 feet. The geophysical crew performed an EM survey at the 7100 Landfill area.

Wednesday, August 20, 1986. The drilling crew continued drilling Well 44 to a depth of 113 feet, where an E-log was taken. Well screen was placed from 60 to 80 feet and the well was gravel packed and grouted to surface. The geophysical crew performed magnetic profiling at the ACW site.

Thursday, August 21, 1986. The drillers started Well 45 and drilled to 103 feet. An E-log was completed. The geophysical crew performed a ground penetrating radar at the ACW site.

Friday, August 22, 1986. At Well 45, well screen and casing were set and the annulus was gravel packed and grouted. The geophysical crew continued the magnetic profiling survey and performed a pipe locator survey at the ACW site.

Saturday, August 23, 1986. The drilling crew drilled Well 47 to 105 feet and AV ran an E-log. The geophysical crew performed additional conductivity survey work at the 7100 Disposal Area.

Sunday, August 24, 1986. At Well 47, the drilling crew set the well screen and filled the annulus with gravel pack and grout edit to the surface. Next they drilled Well 48 to 128 feet and the hole was E-logged.

Monday, August 25, 1986. At Well 48, the well screen was set and the annulus gravel packed and grouted. Next, the drilling crew advanced Well 63 to 40 feet.

Tuesday, August 26, 1986. The pilot hole for Well 63 was advanced to 212 feet.

Wednesday, August 27, 1986. The E-log was taken for Well 63. The drill crew then started reaming the pilot hole in order to place the conductor casing. They advanced to 70 feet.

Thursday, August 28, 1986. The drilling crew finished reaming Well 63 and started to set the conductor casing.

Friday, August 29, 1986. The drill crew could set conductor casing only as far as 70 feet because of problems with the casing.

Tuesday, September 2, 1986. After more problems with setting the conductor casing at Well 63, the field geologist decided to abandon this hole according to California state standards and start a new one at the contractor's expense. Tracer Research Inc. begins soil gas survey at ACW site.

Wednesday, September 3, 1986. The drill crew started a new hole 8 feet away from the original Well 63. They advanced it to a depth of 50 feet. The soil gas survey continued at the ACW site.

Thursday, September 4, 1986. The drilling crew resumed drilling Well 63 to 155 feet. A second rig arrived on site and drilled Well 62 to 60 feet. The soil gas survey continued at the ACW site.

Friday, September 5, 1986. At Well 63, the drilling crew set conductor casing only as far as 120 feet. The desired depth was 157 feet. At Well 62, the second crew drilled to 240 feet and an E-log was attempted but failed because the hole collapsed. The soil gas survey continues at the 7100 Disposal Area.

Saturday, September 6, 1986. Problems with the conductor casing forced the drilling crew to remove the casing from Well 63 and to redrill again. Conductor casing was then set at 155 feet. The E-logger attempted to E-log Well 62 but failed again. The soil gas survey finishes work at the 7100 Disposal Area and ACW sites.

Sunday, September 7, 1986. The drilling crew redrilled Well 62 and an E-log was taken. At Well 61, the drill crew started the hole and drilled to 160 feet. At Well 63, conductor casing was grouted in place.

Monday, September 8, 1986. The development crew arrived and developed Well 47, 43 and 44. At Well 61, the drillers advanced the hole to a total depth of 240 feet. After some difficulties, an E-log and a caliper were taken there. Well 63 was drilled down to 212 feet and the well screen was placed at 175 to 195 feet.

Tuesday, September 9, 1986. The development crew developed Well 45 and 63. The pilot hole at Well 62 was reamed to 40 feet. The pilot hole at Well 61 was reamed to 55 feet. The development crew bailed Well 48.

Wednesday, September 10, 1986. The development crew finished Well 48. The drilling team finished reaming the pilot holes for Wells 61 and 62. The conductor was set to 122 feet in Well 62. The development of Well 45 was completed. The development crew reported 15 feet of fill in Well 63 was producing 7 gal/min of sandy and silty water.

Thursday, September 11, 1986. The drilling crew reamed Well 61 to a depth of 214 feet. The screen and casing were inserted in the hole with the screen at 184 feet to 204 feet and the well was completed. Well 62 was reamed to depth of 215 feet and the screen set at 181 to 201 feet ± 1 foot, and completed according to specifications. The development crew finished Well 63.

Friday, September 12, 1986. A pilot hole was drilled for Well 64 to 190 feet and for Well 65 to 225 feet. The development crew worked on Well No. 62.

Saturday, September 13, 1986. The construction crew set the conductor casing to 115 feet in Wells 64 and 65. Both wells were then grouted and left to set overnight.

Sunday, September 14, 1986. The bottom of Well 64 was drilled to 210 feet and Well 65 to 225 feet. The screen was set at 175 to 195 feet in Well 64, and 195 to 215 feet in Well 65. Well 65 completed as designed. At Well 64, gravel was placed to 171 feet, silica sand to 169 feet, and bentonite to 164 feet. It was

then grouted and completed. The drillers went on to drill Well 49 to a depth of 25 feet. In moving the second drilling rig to Well 66, the axle broke on mud system trailer. The rig would not be operational until 10:00 to 11:00 A.M. on September 15.

Monday, September 15, 1986. Well MAFB-49 was drilled to 120 feet and the screen set at 97 feet to 107 feet. The casing was then set and the well completed according to design. The drillers moved on to MAFB-66 and drilled the pilot hole to 205 feet.

Tuesday, September 16, 1986. Rain at times. The drill rig at MAFB-49 moved to the MAFB-40 well site in the gravel pit outside the 7100 Landfill area. The pilot hole for Well MAFB-40 was drilled to 124 feet and an E-log run. The screen was then set at 92 to 112 feet gravel packed and grouted in place. This completed the well according to design.

At Well 66, the conductor casing was set and grouted to 142 feet. It was decided to drill below 200 foot level to next aquifer since E-log showed the gravel at approximately 155 feet to be in a clay matrix. The extra drilling would take place the next day, after the conductor casing grout had set.

Wednesday, September 17, 1986. The drill rig at Well MAFB-40 moved to MAFB-41, the well site where the pilot hole was drilled and E-logged. The pilot hole was reamed to 153 feet. The E-log indicated the screen should be set at 100 to 120 feet. Since gravel was found at 260 feet at Well MAFB-66, it was drilled to a total depth of 280 feet. After E-logging, the screen was set at 247 to 267 feet. Screen cleaned using Alconox and dried with a torch to volatize hydrocarbons (because the steam cleaner was broken).

Thursday, September 18, 1986. Wells MAFB-41 and MAFB-66 were grouted and thus complete. The drill rigs moved to Wells MAFB-42 and MAFB-55. A large auger rig was brought into install 50-60 feet of surface casing in a few sites where cobbles were a problem. The auger rig completed work at MAFB-52, where the surface casing was set to 55 feet. The auger then began work

at MAFB-46. The MAFB-42 pilot hole was reamed to 130 feet and E-logged. Then the screen was set at 90 feet to 110 feet, and the well was grouted and thus complete. At Well MAFB-55 work stopped at the 110-foot depth.

Friday, September 19, 1986. At Well MAFB-55 the drillers advanced the pilot hole to 250 feet. Well MAFB-46 was drilled to 110 feet, E-logged, and the screen set at 70 to 90 feet. The well was then completed according to specifications.

Saturday, September 20, 1986. The drill rig at Well MAFB-55 was repaired, and the conductor casing was set at 126 feet. At Well MAFB-59, the pilot hole was drilled to 240 feet.

Sunday, September 21, 1986. Well MAFB-55 was completed and the conductor casing set in Well MAFB-59.

Monday, September 22, 1986. At Well MAFB-59 the bottom of the reamed hole was drilled to 250 feet, but the E-log indicated that the desired screening zone was at 190 feet, we backfilled the hole with sand and sealed it with a bentonite plug from 185-190 feet. The well was built and completed according to specifications. The pilot hole for Well MAFB-57 was drilled to 200 feet and the well was E-logged.

Tuesday, September 23, 1986. At Well MAFB-57, conductor casing was set and grouted. The drillers drilled the Well MAFB-58 pilot hole to 240 feet and an E-log was run. Well MAFB-58 was reamed to 150 feet.

Wednesday, September 24, 1986. Well MAFB-57 was completed. At Well MAFB-58, 10-inch conductor casing was set and grouted.

Thursday, September 25, 1986. Well MAFB-58 was completed. At Well MAFB-56, the pilot hole was drilled to 205 feet and the well was E-logged. Conductor casing was set and grouted. The drillers began the pilot hole at Well MAFB-60 and ended at 123 feet.

Friday, September 26, 1986. Well MAFB-56 was completed and sounded at 174 feet. At Well MAFB-60, the pilot hole was drilled to 240 feet and E-logged.

Saturday, September 27, 1986. Well MAFB-50 was completed. At Well 60, the conductor casing was set and grouted.

Sunday, September 28, 1986. Well MAFB-60 was completed. At Well MAFB-68, problems were encountered due to caving. Work stopped at 110 feet for the night. The drill rig was moved to the site for Well MAFB-73 so drilling could begin in the morning.

Monday, September 29, 1986. Well MAFB-73 was drilled and completed. Its total depth was 135 feet, with the screen set at 112 to 132 feet. The drillers sank the pilot hole for Well MAFB-68 to 245 feet. Well development began at Wells 62 and 46.

Tuesday, September 30, 1986. MAFB-68 was E-logged. Well MAFB-75 was drilled, E-logged, and completed. Its total depth was 114 feet, with the screen set at 91 to 111 feet. At Well MAFB-68, the conductor casing was set and grouted. Wells 49, 61 and 60 were developed.

Wednesday, October 1, 1986. Well MAFB-68 was completedat a total depth of 245 feet. Its screen was set at 207 to 227 feet. Well MAFB-52 was drilled and completed at 140 feet with its screen set at 105 to 125 feet. The Well MAFB-67 pilot hole was drilled to 10 feet. Well development continued on Well 61 and began at Wells 58, 55 and 40.

Thursday, October 2, 1986. The drillers advanced the pilot hole for Well MAFB-67 to 210 feet. The E-log was completed. MAFB-67 was reamed to 40 feet. They then drilled the Well MAFB-70 pilot hole to 200 feet and ran the E-log. Well development continued on Wells 61 and 49 and began at Wells 56 and 42.

Friday, October 3, 1986. Conductor casing was set and grouted in Wells MAFB-67 and 70. Well development began at Wells 41, 57, 40 and 68.

Saturday, October 4, 1986. Well MAFB-67 was completed. The screen is set at 190 to 210 feet. Well MAFB-70 was also completed and the screen set at 183 to 203 feet. Well development continued at Well 68 and began at Wells 64, 65 and 75.

Sunday, October 5, 1986. The drilling crew drilled Well MAFB-54 to a total depth 144 feet, then completed it after setting the screen at 110 to 130 feet. Drilling at Well MAFB-69 was difficult; the pilot hole was drilled to 230 feet. Well development began at Wells 73, 75 and 66.

Monday, October 6, 1986. At Well MAFB-69, the conductor casing was set and grouted. At Well MAFB-71, the drilling crew sank the pilot hole to 240 feet, after which an E-log was completed. Well development began at Wells 50, 52 and 70.

Tuesday, October 7, 1986. At MAFB-69, the screen was set at 207-227 ft. and the well was completed. At Well MAFB-71, the conductor casing was set and grouted. Well development continued at Well 50 and began at Wells 59 and 67.

Wednesday, October 8, 1986. Well MAFB-71 was completed after setting the screen at 200 to 220 feet. After drilling the Well MAFB-51 pilot hole to 170 feet, the crew E-logged it. The pilot hole for Well MAFB-53 was then drilled to depth of 20 feet. Well development began at Wells 54, 61 and 62.

Thursday, October 9, 1986. The pilot hole at Well MAFB-53 was advanced to total depth, reamed and completed at a total depth of 180 feet. The screen was set at 157 to 177 feet. Well MAFB-51 was also completed and the screen set at 105 to 125 feet. At Well MAFB-72, the pilot hole was drilled to 100 feet. Well development began at Wells 69 and 71.

Friday, October 10, 1986. The pilot hole at Well MAFB-76 was advanced to total depth, reamed and completed with the screen set at 87 to 107 feet. At Well MAFB-72 the pilot hole was advanced to total depth, reamed and the conductor casing was set and grouted. Well development began at Wells 51 and 53.

Saturday, October 11, 1986. Well MAFB-72 was completed at a total depth of 215 feet; the screen was set at 195 to 215 feet. Well development continued at Well 61 and began at Well 76.

Sunday, October 12, 1986. The crew developed Well MAFB-72.

Monday, October 13, 1986. After painting the well casings, the driller placed screen caps on the wells and poured the final two cement pads.

FIRST SAMPLING ROUND

Sunday, November 9, 1986. The sampling crew pumped Well 51, but the pump stuck in well and had to be left overnight.

Monday, November 10, 1986. After freeing the pump, the crew sampled Well 51, then went on to pump Well 52. Again, the pump became stuck, but it was freed within an hour. The sample pump got stuck in the well because the flexible discharge line came loose and jammed in beside the pump, wedgeing it into the well. This problem was rectified by using tie wraps to keep the discharge line and the power cable together while the pump was in the hole. The wells are all straight. When sampling Well 52, the crew noted a slight sheen on water, which was dirty.

Tuesday, November 11, 1986. After pumping Well 70, the crew sampled it and found the water dirty. Wells 53, 71, 54, 72, and 3 were also pumped and sampled.

Wednesday, November 12, 1986. The crew pumped and sampled Well 67. At Well 2, they ran the pump only one minute, because it discharged heavy mud. After cleaning the pump, Well 2 was pumped and sampled in the afternoon. Thereafter they pumped and sampled Wells 68, 1, and 50 and pumped Well 69.

Thursday, November 13, 1986. After sampling Well 69, the sampling crew pumped and sampled Wells 63, 48, 11, and 61 and pumped Well 10.

Friday, November 14, 1986. After sampling Well 10, the crew pumped Well 62, which went dry. They pumped and sampled Wells 47, 60, 64, and 76. After pumping Well 45, they sampled Well 62, which had by that time accumulated sufficient water.

Saturday, November 15, 1986. The sampling crew pumped and sampled Wells 75, 65, 73, 66, and 49 and sampled Well 45.

Sunday, November 16, 1986. Wells 46, 59, 8, 58, and 9 were pumped and sampled.

Monday, November 17, 1986. Wells 43, 7, 44, 55, and 40 were pumped and sampled.

Tuesday, November 18, 1986. The sampling crew pumped and sampled Wells 42, 57, 41, and 56.

SECOND SAMPLING ROUND

Monday, December 8, 1986. The crew began the second round by pumping and sampling Wells 48, 63, and 10. Well 62 went dry when pumped, as it had on the first round. They left it to sample later. They then pumped and sampled Well 11, pumped Well 61, and sounded Wells 34, 35, and 33.

Tuesday, December 9, 1986. After sampling Wells 61 and 62, the crew pumped and sampled Wells 47, 60, 46, 59, 40, 55, and 8, pumped Well 65, and sounded Wells 30, 28, 29, 38, and 39.

Wednesday, December 10, 1986. The crew sampled Well 65, then pumped Well 75, which pumped dry. It was sampled later. Next they sampled and pumped Wells 76, 64, 73, and 66, and sounded Wells 19, 20, 21, 12, 13, 31, and 32.

They then sampled production Wells HW-04-G1, MB-01-G1, K-9-G1, HW-03-G1, MB-04-G1, HW-05-G1, HW-06-G1, and HW-01-G1 and pumped Well 58.

Thursday, December 11, 1986. The crew sampled Well 58, pumped and sampled Wells 9, 42, 57, 41, 56, 7, and 43, and pumped Wells 45 and 44.

Friday, December 12, 1986. After sampling Wells 44 and 45, the crew pumped and sampled Wells 49, 70, 52, 53, and 71, as well as sampling production Wells AC-01-G1 and JT-01-G1. They also pumped Well 54 and sounded Well 37.

Saturday, December 13, 1986. After sampling Well 54, the sampling crew sounded Wells 16, 17, 18, 27C, 22, 23, 24, 25, and 26, then pumped and sampled Wells 72, 50, 51, 69, 68, 1, and 67. Well 2 went dry when pumped and showed a very muddy discharge.

Sunday, December 14, 1986. On the last day of sampling, the crew sampled Well 2 and pumped and sampled Well 3.

APPENDIX M

Quality Assurance Program/Sample Reliability

A key element of the QA/QC program was to establish routine quality control procedures not only at the instrumental analytical methods level, but also at the field sampling level. Sampling error can impact measurement data significantly, especially for sensitive parameters, such as volatile organic compounds, which require extreme care in sampling to minimize loss and prevent sample contamination. In many cases, analytical errors may account for a negligible small portion of the total measurement error.

1. Field Sampling Quality Assurance

The Mather field sampling program was carefully planned and executed. The sampling crew followed specific procedures throughout the sampling program to ensure consistency and minimize error. During groundwater sampling, the following steps were taken to assure reliability:

- Well purging: All well-purging equipment (pump, discharge hose) was kept clean, including rinsing with drinking quality water between use at different wells. This procedure is considered adequate to prevent cross-contamination of wells; this equipment is not used to collect samples, only for well evacuation.

- Decontamination: Between well samplings, the sampling crew decontaminated all the sampling equipment. This process included a wash with Alconox detergent, a rinse with drinking-quality water and a second rinse with de-ionized water. We then wrapped the equipment in aluminum foil to ensure cleanliness. The well sampler (i.e., the crew member who handled the sample bailer) wore a new pair of latex surgeon's gloves while sampling each well. The first two bailers of well water were used to rinse the decontaminated sample bucket.

- Sample containers: All sample bottles were cleaned to EPA protocols by the supplier and had Teflon-lined caps.

- Sample preservatives: Preservatives were American Chemical Society certified reagent grade or better. Nitric acid for metals samples was analyzed spectral grade.

- Sample integrity: Sampling crew personnel wore latex surgeons' gloves during sampling. Samplers used a new pair of gloves for each well sampled.

- Field duplicates: Ten percent of the samples were split in the field and submitted as blind duplicate quality control samples to monitor overall precision.

- Field blanks: One blind field blank was submitted to the laboratory for every 20 samples taken (two blanks per sampling round). It was prepared with purified, pre-analyzed water. The blank water was transferred to the stainless steel sampling bailer, which was rinsed twice, then sampled for VOCs. The bucket was then filled with water from successive bailers to sample for the remaining parameters. Samples requiring metals analysis were filtered through a 0.45 µm membrane and prefilter with the pressure filtration apparatus. Blank samples were preserved in the same manner as groundwater samples.

- Field Measurements: Conductivity and pH meters were calibrated at least once daily. Calibrations were checked periodically during the course of the sampling day with pH standards traceable to the National Bureau of Standards (NBS), and the instruments were recalibrated if necessary. Groundwater temperature was measured with a digital thermometer, accurate to $0.1^{\circ}C$.

- Field Observations: Thorough observations of each sampled well were entered in a field logbook for later comparison with laboratory results.

- Sample storage and shipping: Samples were placed on ice in insulated coolers immediately after collection and were kept at approximately $4^{\circ}C$ during shipment. Upon receipt by the laboratory, the samples were kept in regulated cold storage at $4^{\circ}C$.

- o Chain-of-custody: Sample custody was maintained by the sampling team until shipment. Each sample shipment included chain-of-custody forms documenting sample identification, date sampled, analyses required, sampling team members' names, signatures and shipping time and date. Transported coolers were taped securely closed with strapping tape for shipment. Custody seals were affixed to the cooler during shipment to alert the laboratory to signs of tampering. Laboratory sample control personnel were instructed to contact AV if coolers were delivered with broken seals.

2. Laboratory Quality Assurance

a. Quality Assurance Plan

The Acurex laboratory maintains a project quality assurance (QA) plan for the Mather Phase II, Stage 3 analytical program, as well as method-specific quality control procedures which follow U.S. EPA guidelines. Key elements of the Mather QA plan are:

- o Project organization and responsibility.
- o QA objectives for measurement data -- define objectives for analytical precision, accuracy and completeness.
- o Sample custody procedures.
- o Calibration procedures, including frequency.
- o Analytical procedures -- define the methods employed for Mather IRP sample analysis.

- Data reduction, validation and reporting.
- Internal QC checks, including frequency.
- Performance and system audits, including frequency.
- Preventive maintenance.
- Assessing precision, accuracy and completeness. Method-specific definitions.
- Corrective action.

The Acurex Quality Assurance Plan for analysis of Mather Air Force Base samples is included in Appendix E.

b. Laboratory Quality Assurance/Quality Control Data

Quality control (QC) in the laboratory is monitored using method blanks, duplicate samples and matrix spike samples. Through the analysis of this QC data, the overall analytical accuracy and precision may be estimated on a method-specific basis. The greater the frequency of QC samples, the more representative this estimate becomes. The following is a discussion of the laboratory QC data by analytical method. A description of each method is presented in EPA, 1976; EPA, 1979; and EPA, 1982a and 1982b. Laboratory QA/QC sample results are shown in Table M-1.

- Volatile Organic Compounds (VOC) EPA Methods 601/8020

Method blank and storage blank data show no signs of sample or system contamination, except for methylene chloride (CH_2Cl_2) detected in the 601 blank samples in the range <0.5 µg/l - 4.1 µg/l. Methylene chloride, which is ubiquitous in most laboratories, was detected at comparable levels in the groundwater samples. No detectable levels of any other compounds were found in the blank samples.

TABLE M-1. Laboratory Quality Assurance Data Summary

[illegible]

METALS LABORATORY BLANKS (UG/L)

REP NO	DATE	As	Cd	Cr	Pb	Ag
[illegible] 044	[illegible]/20/87	ND	ND	[illegible]0	ND	ND
[illegible] 047	[illegible]/20/87	ND	ND	[illegible]	ND	ND
[illegible]-050	[illegible] 20/87	ND	ND	[illegible]	ND	ND
[illegible]	[illegible]/20/87	ND	ND	30	ND	ND
[illegible]-020	01/21/87	ND	ND	20	ND	ND
[illegible]	01/21/87	ND	ND	15	ND	ND

ALKALINITY LABORATORY METHOD BLANKS

REP NO	DATE	[illegible] ALKALINITY	[illegible] ALKALINITY	[illegible] ALKALINITY
ROUND 1	[illegible]/21/86	ND	ND	ND
	[illegible]/96	ND	ND	ND
ROUND 2	[illegible]/09/96	ND	ND	ND
	12/[illegible]6/96	ND	ND	ND
	12/1[illegible]/96	ND	ND	ND

MINERALS LABORATORY BLANKS (MG/L)

REP NO	DATE	Ca	Fe	Mg	Mn	K	Na
361[illegible] 030	[illegible]/20/86	0.6	0.022	ND	ND	ND	0.09
361[illegible]-040	01/20/87	0.[illegible]2	0.01	ND	ND	ND	0.16
361[illegible]-043	01/20/87	0.12	0.01[illegible]	ND	ND	ND	[illegible]
361[illegible]-044	01/20/87	0.07	ND	ND	ND	ND	ND
361[illegible] 047	01/20/87	0.[illegible]4	ND	0.04	ND	ND	0.06
361[illegible] 050	01/20/87	0.13	0.015	ND	ND	0.02	0.[illegible]7
3612-014	01/20/87	0.1	0.012	ND	ND	ND	ND
3612-01[illegible]	01/20/87	0.13	0.012	ND	ND	ND	0.06
3612-019	01/21/87	0.08	0.012	ND	ND	ND	ND
3612-020	01/21/87	0.17	0.012	ND	ND	ND	ND
3612-02[illegible]	01/21/87	0.1	0.009	ND	ND	ND	0.1
3612-023	01/21/87	0.2	0.015	ND	ND	ND	0.16

ANIONS LABORATORY METHOD BLANKS

REP NO	DATE	CONCENTRATION [illegible]
ROUND 1	[illegible]/12/96	ND
	11/15/86	ND
	1[illegible]/31/86	ND
ROUND 2	12/10/86	ND
	12/11/96	ND
	12/12/86	ND
	12/14/96	ND
	12/16/86	ND

As, Hg and Se LABORATORY BLANKS

REP NO	DATE	As	Hg	Se
NOV 1986	ALL SIX METHOD BLANKS BELOW DETECTION			
DEC 1986				
MDL (UG/L)		2	0.2	2

TOTAL CYANIDE LABORATORY METHOD BLANKS

REP NO	DATE	TOTAL CYANIDES(MG/L)
ROUND 1	11/26/86	ND
ROUND 2	12/19/86	ND
	12/19/86	ND

PETROLEUM HYDROCARBONS LABORATORY METHOD BLANKS

REP NO	DATE	MG/L	MDL
ROUND 1	[illegible]/21/86	ND	
ROUND 2	[illegible]/18/86	ND	

TABLE M-1. (con't)

COMPOUND										
[illegible]THANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]THANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]METHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]METHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]CHLORIDE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]METHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]ETHENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]ETHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]ETHENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]ETHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]METHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
CARBON TETRACHLORIDE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]METHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]ETHENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]BENZENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]METHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]ETHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]BENZENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TETRACHLOROETHENE PCE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]BENZENES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

[illegible] MATRIX SPIKES PERCENT RECOVERY

	RUN NO:	[illegible]	[illegible]244	86[illegible]250	[illegible]	86[illegible]220	86[illegible]	86[illegible]			AMOUNT SPIKED
COMPOUND	SAMPLE#:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	MEAN	STD DEV	[illegible]
BENZENE		[illegible]	98%	[illegible]	[illegible]	[illegible]	94%	95%	[illegible]	[illegible]	[illegible]
[illegible]		97%	96%	94%	[illegible]	[illegible]	94%	95%	[illegible]	[illegible]	[illegible]
[illegible]DB		[illegible]	93%	96%	[illegible]	[illegible]	[illegible]	94%	[illegible]	[illegible]	[illegible]
[illegible]DB		[illegible]	[illegible]	[illegible]	[illegible]	94%	[illegible]	94%	100%	[illegible]	[illegible]
[illegible]B		[illegible]	103%	96%	98%	[illegible]	98%	94%	98%	4%	[illegible]
ETHYLBENZENE		93%	94%	99%	[illegible]	97%	[illegible]	93%	96%	4%	[illegible]
TOLUENE		99%	97%	100%	100%	100%	94%	97%	98%	[illegible]	
TOTAL XYLENES		[illegible]	102%	100%	[illegible]	100%	93%	91%	94%	[illegible]	[illegible]

METALS AND MINERALS MATRIX SPIKES PERCENT RECOVERY

	ROUND #:	[illegible]	[illegible]	[illegible]	[illegible]	2	2	[illegible]	[illegible]	2		
ELEMENT	SAMPLE ID:	[illegible]	[illegible]	799	[illegible]	[illegible]	656	[illegible]	[illegible]	630	MEAN	STD DEV
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
[illegible]		[illegible]	94%	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
[illegible]		94%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
[illegible]		100%	101%	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
[illegible]				96%				[illegible]			[illegible]	[illegible]
[illegible]				96%				[illegible]			[illegible]	[illegible]
[illegible]				99%				99%			99%	[illegible]
[illegible]				95%				96%			[illegible]	[illegible]
Ag				52%				56%			54%	[illegible]
As									94%	93%	94%	[illegible]
Hg								90%	[illegible]		[illegible]	.3%
Se									96%	114%	105%	[illegible]

ALKALINITY MATRIX SPIKES PERCENT RECOVERY

	ROUND #:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
COMPOUND	SAMPLE#:	[illegible]	[illegible]	[illegible]	625	636	656	MEAN	STD DEV
HCO3-		103%	110%	103%	103%	[illegible]	102%	104%	[illegible]
CO3-		NS	NS	NS	NS	NS	NS	0%	0%
OH-		NS	NS	NS	NS	NS	NS	0%	0%

TDS MATRIX SPIKES PERCENT RECOVERY

ROUND #:	[illegible]
SAMPLE#:	[illegible]
TOTAL DISSOLVED SOLIDS	[illegible]

NS NOT SPIKED

ANIONS MATRIX SPIKES PERCENT RECOVERY

	ROUND #:	1	1	1	2	2	2		
COMPOUND	SAMPLE#:	755	778	797	623	634	656	MEAN	STD DEV
BROMIDE		93%	93%	98%	99%	96%	105%	96%	5%
CHLORIDE		90%	99%	97%	99%	91%	96%	94%	4%
FLUORIDE		95%	93%	91%	93%	94%	9[illegible]%	93%	1%
NITRATE		91%	90%	100%	110%	95%	100%	98%	[illegible]%
NITRITE		99%	93%	95%	99%	[illegible]	98%	94%	4%
PHOSPHATE		90%	97%	94%	99%	92%	99%	[illegible]	[illegible]
SULFATE		95%	95%	100%	105%	95%	93%	[illegible]	1%

PHENOLS SPIKES PERCENT RECOVERY

ROUND #:	[illegible]
SAMPLE#:	[illegible]
TOTAL PHENOLS	5%

TOTAL CYANIDE MATRIX SPIKES PERCENT RECOVERY

ROUND #:	1	1	2		
SAMPLE#:	797	QC SAMPLE	640	MEAN	STD DEV
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE M-1. (con't)

[illegible]

METALS LABORATORY DUPLICATES (MG/L)

[illegible]	SAMPLE ID			RPD			RPD	Mg		RPD	Mn		RPD			RPD			RPD
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%	ND	ND		.4	.3	4%	46	[illegible]	[illegible]%
[illegible]	[illegible]		[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	[illegible]	0.5	[illegible]%	ND	ND		[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%
[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	[illegible]	ND		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%			[illegible]%
[illegible]	[illegible]		[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	ND	ND		[illegible]	[illegible]	[illegible]			[illegible]%
[illegible]	[illegible]		[illegible]	0%	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	0%	0.064	0.061	[illegible]%	[illegible]	[illegible]	[illegible]%			[illegible]%
[illegible]	[illegible]	.4	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	0.40	0.42	[illegible]%	ND	ND		[illegible]	.4	[illegible]	[illegible]		[illegible]%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	[illegible]	0.36	36%	ND	ND		[illegible]	[illegible]	[illegible]%		[illegible]	[illegible]%
[illegible]	[illegible]	44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%			[illegible]%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]	[illegible]%	[illegible]	6	[illegible]%	ND	ND		[illegible]	[illegible]	[illegible]%		[illegible]	[illegible]%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.098	[illegible]%	[illegible]	[illegible]	[illegible]%	ND	ND		[illegible]	[illegible]	[illegible]			[illegible]%

METALS LABORATORY DUPLICATES (UG/L)

[illegible]	SAMPLE ID			[illegible]			RPD			RPD			RPD	Ag		RPD
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%	ND	ND		[illegible]	[illegible]	[illegible]%	ND	[illegible]		[illegible]	ND	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%	ND	ND		29	[illegible]	[illegible]%	ND	ND		ND	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]%	[illegible]	ND		[illegible]	[illegible]	[illegible]%	[illegible]	[illegible]		[illegible]	ND	
[illegible]	[illegible]	170	170	[illegible]%	ND	ND		[illegible]	[illegible]	[illegible]%	ND	ND		ND	[illegible]	

ANIONS DUPLICATES

SAMP RD	SAMPLE ID	BROMIDE		RPD	CHLORIDE		RPD	FLUORIDE		RPD	NITRATE		RPD	NITRITE		RPD	PHOSPHATE		RPD	SULFATE		RPD
[illegible]	760	ND	ND		0.5	0.6	0%	0.3	0.3	0%	0.4	0.4	0%	ND	ND		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]%
	770	ND	ND		0.5	0.4	4%	[illegible]	[illegible]	0%	[illegible]	[illegible]	0%	ND	ND		ND	ND		[illegible]	[illegible]	[illegible]%
	[illegible]	0.1	0.2	67%	[illegible]	[illegible]	0%	ND	ND		0.6	0.6	0%	ND	ND		ND	ND		[illegible]	[illegible]	[illegible]%
	779	0.1	0.1	0%	4.7	4.9	4%	[illegible]	[illegible]	0%	0.6	0.6	0%	ND	ND		ND	ND		[illegible]	5.3	[illegible]%
	801	ND	ND		ND	ND		ND	ND		ND	ND		ND	ND		ND	ND		ND	ND	
ROUND 2	607	0.3	0.3	0%	[illegible]	5.7	1%	ND	ND		4	4	0%	ND	ND		ND	ND		[illegible]	5.3	0%
	622	ND	ND		[illegible]	0.3	0%	ND	ND		[illegible]	[illegible]	[illegible]%	ND	ND		ND	ND		[illegible]	[illegible]	0%
	633	0.2	0.3	40%	4.4	4.4	0%	0.2	0.2	0%	[illegible]	[illegible]	0%	0.5	0.5	0%	ND	ND		.4	.4	0%
	646	0.4	0.4	0%	0.3	0.3	0%	0.3	0.3	0%	ND	ND		ND	ND		0.5	0.5	0%	[illegible]	[illegible]	0%
	647	ND	ND		0.5	0.4	1%	0.2	0.1	0%	[illegible]	[illegible]	0%	ND	ND		ND	ND		4.5	4.5	0%
	655	0.4	0.4	0%	0.5	0.4	4%	0.2	0.2	0%	0.3	ND		ND	ND		ND	ND		4.5	4.5	0%

ALKALINITY DUPLICATES (MG/L, AS CaCO3)

SAMPLING RD NO	SAMPLE ID	HCO_3^- ALKALIN		RPD	$CO_3^=$ ALKALIN		RPD	OH^- ALKALIN		RPD
ROUND 1	764	120	120	0%	ND	ND		ND	ND	
	770	59	60	[illegible]%	22	22	0%	ND	ND	
	776	[illegible]	49	4%	ND	ND		ND	ND	
	784	250	240	4%	ND	ND		ND	ND	
	798	150	150	0%	ND	ND		ND	ND	
ROUND 2	[illegible]	[illegible]	52	[illegible]%	ND	ND		ND	ND	
	623	[illegible]	[illegible]	[illegible]%	ND	ND		ND	ND	
	630	57	59	[illegible]%	ND	ND		ND	ND	
	646	49	[illegible]	4%	ND	ND		ND	ND	
	647	45	47	[illegible]%	ND	ND		ND	ND	
	657	55	[illegible]	0%	ND	ND		ND	ND	

TABLE M-1. (con't)

[illegible] LABORATORY DUPLICATES

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

TDS LABORATORY DUPLICATES

SAMPLING ROUND	SAMPLE ID	[illegible]	[illegible]	[illegible]
ROUND [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ROUND 2	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	ND	ND	

TOTAL CYANIDE LABORATORY DUPLICATES

SAMPLING ROUND	SAMPLE ID	TOTAL CYANIDE	RPD
ROUND 1	[illegible]	ND	ND
	[illegible]	ND	ND
ROUND 2	[illegible]	ND	ND
	[illegible]	ND	ND

As, Hg and Se LABORATORY DUPLICATES (ug/l)

REF NO	SAMPLE ID
ALL PAIRED DUPLICATE RESULTS BELOW DETECTION	

PHENOLS DUPLICATES

SAMPLING ROUND	SAMPLE ID	[illegible]
NO DUPLICATES		

Most of the laboratory duplicate pairs had no detectable levels of VOCs. The precision for Method 601 compounds ranges from 6% relative percent difference (RPD) for dibromochloromethane (1.6 µg/l and 1.7 µg/l) to 80% RPD for TCE (2.7 µg/l and 6.3 µg/l) for paired duplicate values. For Method 8020 compounds, the range is 5% RPD for benzene (2.1 µg/l and 2.0 µg/l) to 40% RPD for toluene (10 µg/l and 6.7 µg/l). Generally, precision increases (RPD decreases) as concentration increases above the limit of quantitation (LOQ). The LOQ is calculated statistically and represents the concentration above which an analyte may be measured quantitatively with a greater degree of confidence. The convention is for LOQ = 10 x S_o, where S_o is the estimate of the standard deviation of the lowest level of measurement (noise). For the purposes of this discussion, the LOQ will be considered to be five times the method detection limit for a specific analyte, which is a generally accepted standard. The laboratory objective for precision is <15% RPD, which is met by approximately half the duplicate pairs, for a completeness value of 50% (completeness = acceptable measurements/total x 100%). However, due to the small number of useable data points, the precision estimate may not be representative of the true analytical precision.

Matrix spike sample data indicate very good accuracy, with average recoveries ranging from 87% to 112% for Method 601 compounds and 94% to 100% for Method 8020 compounds.

- Anions, Standard Method 429

The QC data for anion analysis indicate excellent accuracy and precision. The method blanks showed no detectable concentrations of anions. Precision for the majority of the duplicate pairs is 0% RPD, and the percentage of paired values meeting laboratory QA objectives for precision is 98% (completeness).

Matrix spike data range from 88% to 98% average recoveries, indicating excellent accuracy: 100% of the data meet laboratory QA objectives for accuracy.

o Total Dissolved Solids (TDS), EPA Method 160.1

None of the method blanks for TDS analysis showed detectable concentrations, and the duplicates showed good precision, with a completeness value of 86%. Only one matrix spike was analyzed. It had a 94% recovery.

o Carbonate, Bicarbonate and Hydroxide Alkalinity

The method blanks for alkalinity were below detection for carbonate, bicarbonate, and hydroxide alkalinity. Duplicates were analyzed for bicarbonate alkalinity only and showed good precision with a completeness factor of 91%, which meets the QA objectives. Matrix spikes were prepared for bicarbonate only and indicated good accuracy, with a completeness factor of 100%.

o Minerals and Metals by ICP and AA Methods

The analytical precision for the metals and minerals analyzed by inductively coupled argon plasma spectroscopy (ICP) and atomic absorbtion spectrophotometry (AA) was very good, based on the laboratory duplicate data. ICP analysis was for calcium (Ca), iron (Fe), magnesium (Mg), sodium (Na), manganese (mn), barium (Ba), cadmium (Cd), chromium (Cr), lead (Pb), and silver (Ag). AA analysis was for arsenic (As), selenium (Se), mercury (Hg), and potassium (K). Elements such as Ba, Ca, Mg, K and Na, which commonly occurred in the samples at concentrations well above the limit of quantitation (LOQ), had RPD values within laboratory QA objectives. Other elements detected at much lower concentrations (Fe, Mn) showed worse precision. As, Se, Hg, Pb, Cd, and Ag were consistently undetectable in the samples.

Laboratory method blanks showed detectable levels of calcium and sodium that were significantly lower than their concentrations in the samples. These may be artifacts resulting from spectral interferences or instrument background problems, but do not affect the usability of the data. However, chromium and iron were detected in most of the method blanks at

concentrations near or below the LOQ and comparable to levels reported for samples. Since chromium was detected in all of the samples at levels similar to those in the method and field blanks, chromium is definitely an artifact and should not be considered significant. This is also true to a lesser extent for iron, although some samples contain elevated concentrations of this metal and should be considered "real."

h. Miscellaneous Parameters

Because of the small number of samples requiring analysis of cyanide, total petroleum hydrocarbons and total phenolics, there is insufficient QC data to evaluate the reliability of these methods.

3. Laboratory Audit

In March 1987, an AV audit team will conduct a comprehensive system audit of the Acurex laboratory in Mountain View. A similar audit was conducted by AV in April 1986. The goals of these audits are:

- To evaluate the laboratory's methods and procedures relating to the analysis of Air Force IRP samples to ensure that resulting data were true and valid.
- To identify areas that could be improved and to recommend measures to improve the quality of data for IRP samples.
- To maintain and improve the exchange of information and ideas between Acurex and AV to assure the Air Force of a better product.

The results of the March 1987 audit will be reported in the second draft of the Stage 3 report.

F. Reliability of Sampling

1. Field Methods

Groundwater samples taken during the Mather AFB field program were collected using a 1-7/8 inch stainless steel bailer. In sampling groundwater for sensitive analytical parameters such as volatile organic compounds (VOCs) and heavy metals, it is important that the methodology does not alter the composition of the sample chemically or physically. The following factors will impact sample integrity:

a. The adsorption of materials from or the leaching of materials into the sample by the sampling equipment.

b. A change in the pH state or the reduction or oxidation potential of the sample, potentially causing precipitation of dissolved minerals.

c. Degassing of VOCs from the sample as a result of aeration or pressure drops.

The stainless steel and Teflon construction of the sample bailer and transfer bucket minimizes the potential for adsorption of organics and for the introduction of contaminants into the sample. All sampling personnel coming into contact with the sample wore disposable latex gloves, and direct sample contact was avoided. Decontamination of the bailer, bucket and funnel included rinsing them with two bailer volumes of sample water before collection.

All wells were sampled for minerals (sodium, calcium, magnesium, manganese, iron, potassium); several wells for heavy metals. To minimize oxidation and precipitation, the sample was handled gently to avoid splashing, which could aerate the sample during transfers from the bailer to the transfer bucket and from the transfer bucket to the pressure filtration apparatus. Purified grade nitrogen was used in filtering to prevent oxidation. Samples were filtered directly into high density polyethylene bottles and immediately acidified.

Since the elements in their dissolved form were of interest, the sample was filtered through a 0.45 micron membrane immediately after collection. The 0.45 micron pore size has been shown to be optimal for this purpose, as smaller pore size filters yield no significant difference in chemical composition (EPA, 1982b) Proposed Sampling and Analytical Methodologies) and are not practical for use in the field due to their slower filtering rate.

The potential for degassing volatile organics during sample collection with a bailer can be relatively high; during the Mather AFB sampling program several steps were taken to minimize this potential. The bailer was lowered into the well gently to prevent agitation, and VOA samples were taken from the first bailer by gently pouring the water into 40-ml vials.

2. Field Quality Assurance Data

Based upon the field QA/QC sample data, the quality of the Mather data package is good. The overall precision of the measurement system (sampling, packaging, shipping, analysis, reporting) is estimated from the results of blind field duplicate (or "split") analyses. The potential for sample contamination from sample collection, transport, or analytical error may be evaluated from field blank sample results. The accuracy or bias of the total measurement system could not be evaluated, because field spike samples were not included in the scope of work for this investigation. The selection of groundwater duplicates for the first sampling round was based upon suspected contamination and field observation, at a rate of 10% of the total number of samples collected. For the second round, field duplicates were selected to include samples known to be contaminated, based upon the first round results, in order to evaluate precision at levels above the level of quantification, which is typically five times the detection limit. One field blank was prepared for every twenty groundwater samples collected.

Field QA/QC sample results are shown in Table M-2. For duplicate pairs, the precision is expressed as relative percent difference (RPD), calculated using the following equation:

TABLE M-2. Field Quality Assurance Data Summary

601 AND 8020 FIELD DUPLICATES (UG/L)

PAIRED DUPLICATE SAMPLE IDs		VINYL CHLORIDE		RPD	1,1-DCA		RPD	1,2-DCA		RPD	TCE		RPD	PCE		RPD
761	762										770	700	10%			
769	770															
790	791															
798	799	9.9	9.4	5%	0.9	0.9	0%	2.5	2.8	11%	22	21	5%			
607	608				ND	0.9					36	64	56%			
629	630															
640	641													2.3	2.5	8%
651	652										25	35	33%			
658	659															

601 AND 8020 FIELD DUPLICATES (UG/L)

PAIRED DUPLICATE SAMPLE IDs		1,2-DCP		RPD	1,2-DICHLORO BENZENE		RPD	1,4-DICHLORO BENZENE		RPD	TOLUENE		RPD	XYLENES		RPD
761	762															
769	770															
790	791										2.8	2	33%	3	ND	
798	799	1	1.2	18%	3.3	3	10%	3.3	3	10%						
607	608															
629	630										1.7	1.6	6%			
640	641															
651	652															
658	659															

ANIONS FIELD DUPLICATES

PAIRED SAMPLE IDs		BROMIDE		RPD	CHLORIDE		RPD	FLUORIDE		RPD	NITRATE		RPD	NITRITE		RPD	PHOSPHATE		RPD	SULFATE		RPD
000761	000762	0.1	0.1	0%	3.3	3.2	3%	0.2	0.2	0%	2.3	2.3	0%	ND	ND		ND	ND		[illegible]	[illegible]	3%
000769	000770	ND	ND		2.5	2.4	4%	0.1	0.1	0%	1.1	1.1	0%	ND	ND		ND	ND		[illegible]	[illegible]	
000790	000791	0.1	0.1	0%	3.8	4	5%	0.2	0.2	0%	1.3	1.4	7%	ND	ND		ND	ND		[illegible]	[illegible]	[illegible]
000798	000799	0.69	0.69	0%	7.49	7.99	6%	ND	0.2		1.4	1.5	7%	ND	ND		ND	ND		[illegible]	[illegible]	
000607	000608	0.2	0.2	0%	6.7	6.8	1%	ND	ND		4	4	0%	ND	ND		ND	ND		[illegible]	[illegible]	
000629	000630	ND	ND		11	11	0%	ND	0.1		ND	ND		ND	ND		ND	ND		[illegible]	[illegible]	
000640	000641	0.2	0.2	0%	22	21	5%	0.2	0.2	0%	3.8	3.8	0%	ND	ND		ND	ND		[illegible]	[illegible]	
000651	000652	ND	ND		3.2	3.1	3%	0.2	0.3	40%	3.2	3.4	6%	ND	ND		ND	ND		[illegible]	[illegible]	
000658	000659	ND	ND		6	6	0%	0.2	0.2	0%	1.8	1.8	0%	ND	ND		ND	ND		[illegible]	[illegible]	

MINERALS FIELD DUPLICATES

SAMPLE ID	DUP ID	SAMPLING ROUND	Ca		RPD	Fe		RPD	Mg		RPD	Mn		RPD	K		RPD	Na	
761	762	1	16	16	0%	0.032	0.036	12%	5.4	5.4	0%	0.003	0.005	50%	1.1	1.2	9%	8.[illegible]	[illegible]
769	770	1	14	14	0%	0.28	0.035	156%	0.46	0.45	2%	ND	ND		2.5	2.7	8%	24	[illegible]
790	791	1	5.5	5.5	0%	0.057	0.034	51%	1.8	1.8	0%	ND	ND		5.1	5.2	2%	[illegible]	[illegible]
798	799	1	37	37	0%	0.32	0.29	10%	17	17	0%	0.13	0.13	0%	1.6	1.4	13%	[illegible]	[illegible]
607	608	2	21	20	5%	0.24	0.24	0%	11	11	0%	0.062	0.061	2%	1.6	1.4	13%	[illegible]	[illegible]
629	630	2	8.7	8.2	6%	0.023	0.015	42%	3.1	2.9	7%	ND	ND		3	2.7	11%	19	[illegible]
640	641	2	43	45	5%	0.18	0.17	6%	23	24	4%	0.093	0.097	4%	1.7	1.8	6%	18	18
651	652	2	7.6	7.5	1%	0.033	0.17	135%	3.5	3.5	0%	0.13	0.12	8%	1.5	1.4	7%	[illegible]	[illegible]
658	659	2	13	14	7%	0.02	0.04	67%	5.6	5.5	2%	0.13	0.12	8%	1.7	1.5	12%	31	

METALS FIELD DUPLICATES

SAMPLE ID	DUP ID	SAMPLING ROUND	As		RPD	Ba		RPD	Cd		RPD	Cr		RPD
790	791	1	ND	ND		0.088	0.019	129%	ND	ND		0.018	0.02	11%
798	799	1	ND	ND		0.11	0.053	70%	ND	ND		0.021	0.017	21%
629	630	2	ND	ND		0.044	0.1	78%	ND	ND		0.02	0.019	5%
640	641	2	ND	ND		0.22	0.1	75%	ND	ND		0.016	0.013	21%

SAMPLE ID	DUP ID	SAMPLING ROUND	Hg		RPD	Pb		RPD	Se		RPD	Ag		RPD
790	791	1	ND	ND		ND	ND		ND	ND		ND	ND	
798	799	1	ND	ND		ND	ND		ND	ND		ND	ND	
629	630	2	ND	ND		ND	ND		ND	ND		ND	ND	
640	641	2	ND	ND		ND	ND		ND	ND		ND	ND	

GENERAL INORGANICS FIELD DUPLICATES (MG/L)

PAIRED SAMPLE ID		BICARBONATE ALKALIN		RPD	CARBONATE ALKALIN		RPD	TOTAL PHENOLS		RPD	TDS		RPD	TOTAL CYANIDE		RPD
000761	000762	68	71	4%	ND	ND		NA	NA		[illegible]	[illegible]	[illegible]	NA	NA	
000769	000770	99	50	66%	ND	22		NA	NA		[illegible]	167	21%	NA	NA	
000790	000791	60	60	0%	8	8	0%	0.024	0.046	63%	[illegible]	[illegible]	[illegible]	ND	ND	
000798	000799	150	151	0%	ND	ND		NA	NA		[illegible]	[illegible]	[illegible]	ND	ND	
000607	000608	99	130	27%	ND	ND		NA	NA		190	190	0%	NA	NA	
000629	000630	57	59	3%	ND	ND		NA	NA		90	84	5%	ND	ND	
000640	000641	220	340	48%	ND	ND		NA	NA		300	280	7%	ND	ND	
000651	000652	49	47	4%	ND	ND		NA	NA		140	140	0%	NA	NA	
000658	000659	140	140	0%	ND	ND		NA	NA		220	220	0%	NA	NA	

NA = NOT ANALYZED

TABLE M-2. (con't)

601 AND 8020 FIELD BLANKS UG/L

SAMPLE ROUND SAMPLE ID	CH2CL2	CHCL3	1,1,1-TCA
1st ROUND			
000772	9.9	4.2	ND
000801	2.4	2.5	ND
2nd ROUND			
000636	0.9	4.8	3.8
000660	0.9	1.9	ND

GENERAL INORGANICS FIELD BLANKS MG/L

SAMPLE ROUND SAMPLE ID	BICARBONATE ALKALINITY	TOTAL PHENOLS	TDS	TOTAL CYANIDE
ROUND 1				
000772	4	NA	11	NA
000801	4	0.03	ND	ND
ROUND 2				
000636	ND	NA	ND	ND
000660	ND	NA	ND	NA

NA - NOT ANALYZED

MINERALS FIELD BLANKS MG/L

SAMPLE ID	ROUND	Ca	Fe	Mg	Mn	K	Na
772	1	0.18	0.032	0.048	ND	ND	0.76
801	1	0.6	0.022	0.13	ND	0.04	0.5
636	2	0.29	0.016	0.05	ND	0.02	0.69
660	2	0.19	0.022	ND	ND	ND	0.75

METALS FIELD BLANKS UG/L

SAMPLE ID	ROUND	As	Ba	Cd	Cr	Hg	Pb	Se	Ag
801	1	ND	0.02	ND	0.023	ND	ND	ND	ND
636	2	ND	0.01	ND	0.02	ND	ND	ND	ND

ANIONS FIELD BLANKS MG/L

SAMPLE ROUND SAMPLE ID	ALL ANIONS CONCENTRATION MG/L
ROUND 1	
000772	ND
000801	ND
ROUND 2	
000636	ND
000660	ND

RPD = RELATIVE PERCENT DIFFERENCE

$$RPD = \frac{X1 - X2}{\frac{X1 + X2}{2}} \times 100\%$$

WHERE X1 AND X2 ARE PAIRED DUPLICATE VALUES

ND = NOT DETECTED AT MDL X DETECTION LIMIT FACTOR

$$RPD = \frac{|X_1 - X_2|}{(X_1 + X_2)/2} \times 100\%$$

where X_1 and X_2 are paired duplicate values.

QA/QC sample results are discussed below by parameter.

a. Volatile Organic Compounds (VOCs) EPA Methods 601/8020

Precision for VOC analysis is difficult to assess, as most of the VOC paired duplicate results are less than the limit of quantitation (LOQ), which is typically five times the method detection limit (MDL). Since the MDL for all VOC compounds is 0.5 µg/l, the LOQ is approximately 2.5 µg/l. Trichloroethene (TCE), the most common compound found in Mather groundwater samples, was detected in four duplicate pairs at concentrations above the LOQ. The precision for TCE paired values ranged from 9.5% RPD to 56% RPD. This is comparable to the laboratory precision of 9% to 80% RPD, based upon three quantifiable laboratory duplicate pairs, indicating no significant loss of precision due to sampling error.

Duplicate precision appeared to be independent of analyte concentration. Generally, precision, or reproducibility, increases with increasing concentration, although that trend was not observed with these data. For example, two field duplicate pairs had detectable concentrations of tetrachloroethene (PCE), with paired values 2.7/2.6 µg/l (3.8% RPD) and 7.7/18 µg/l (80% RPD). Since field duplicate data provides an estimate of precision for the entire measurement system, field sampling errors cannot be distinguished from analytical errors.

The available field duplicate data show acceptable precision for VOC analyses, although insufficient data are available to assess the precision with a high degree of confidence.

The field blank VOC samples showed no significant evidence of potential sample contamination. Chloroform was found in all four blanks, ranging from 1.9 µg/l to 4.8 µg/l. This contamination was traced back to the reagent water used in preparing the blank samples and was not contributed by the sampling, shipping or analysis activities.

b. Total Dissolved Solids (TDS), EPA Method 160.1

Precision for TDS analysis was very good, based upon field duplicate data. Field duplicate precision was comparable to laboratory duplicate precision, indicating no significant field induced sampling error. One field blank sample had a reported concentration of 11 mg/l TDS, which, compared to the MDL of 10 mg/l, does not represent significant sample contamination. The other three field blanks had no detectable TDS.

All of the TDS samples were analyzed within the EPA-specified 48-hour holding time with the exception of four: sample Nos. 000775, 000798, 000799, and 000800, which had holding times of three days. TDS data for these four samples is not considered valid, but are included in the data tables in Appendix N for comparison purposes.

c. Anions, Standard Method 429

Overall precision for anion analysis was excellent. The relative percent difference (RPD) values for paired duplicate results were less than 10% in all but one case. This is comparable to the laboratory precision, which was also excellent. No detectable concentration of the seven anions of interest (Cl^-, F^-, Br^-, $NO_2^=$, NO_3^-, $SO_4^=$, $PO_4^=$) were found in any of the field blank samples.

All of the anions samples were analyzed within generally accepted holding time guidelines (Method 429 does not specify holding times) with the exception of nitrate/nitrite and phosphate. The most stringent guidelines available are from EPA Method 300.0, which specifies a 48-hour holding time for nitrate/nitrite and phosphate. Although this method was not used, the holding time guidelines will be followed to ensure the validity and comparability of the data. The following samples exceeded the 48-hour holding time for the three aforementioned anions: sample Nos. 000651-000657, 000775, 000784, 000798-000800. The nitrate/nitrite and phosphate data for these samples are not considered valid (they were analyzed three days after collection) but are included in the data tables in Appendix N for comparison purposes, and were also used in the anion-cation balance calculations (trilinear diagrams).

d. Metals and Minerals, ICP and AA Methods

Overall precision for minerals and metals paired field duplicates is very good, especially for elements detected at levels above the LOQ. The RPDs for naturally occurring elements calcium, magnesium, manganese, potassium and sodium were all below 15%. Precision for elements detected at concentrations very near the MDL was not as good; these included iron and barium. This is the expected trend, in which precision increases with increasing concentration.

Chromium was detected at approximately 0.02 mg/l in all samples, including field blanks and laboratory blanks; it is suspected to be an artifact. Barium and iron, more commonly occurring elements, were also detected in the field blanks at concentrations similar to those reported for the samples, but were well below existing water quality criteria.

e. Alkalinity, Standard Method 403

Bicarbonate is the only detectable alkalinity parameter in the field duplicate samples and shows acceptable precision based upon RPD values from paired duplicates. Field blanks from the first round of sampling both had

reported concentrations of 4 mg/l, which is small compared to the average bicarbonate value in the samples. No detectable concentrations were reported for the blanks from the second round.

f. Miscellaneous Parameters

Few field QA/QC data are available for cyanide, total petroleum hydrocarbons and total phenolics due to the small number of samples. Therefore, no conclusions may be made concerning the reliability of the measurement system. The single total phenolics field duplicate had an RPD of 63%, which is inconclusive, especially since no laboratory precision data are available for this parameter.

G. Summary

The overall quality of the analytical data package is good based on field QA/QC sample data. Insufficient data were available to assess the overall precision for the low frequency parameters (total phenolics, total petroleum hydrocarbons, cyanide). The precision of the volatile organic analyses for the overall measurement system, based on field duplicate data, is comparable to the laboratory precision, which indicates reliable sample collection, packaging and shipping activities. The metals and minerals QA/QC data indicates that chromium and iron may be artifacts, but because of the very low levels involved, the significance of these elements is negligible. The field duplicate and blank data for the anions show the quality of these measurements to be excellent.

APPENDIX N

Sample Results Tables

TABLE N-1. Groundwater sampling results for Well MAFB-01 at Mather AFB, California ACW DISPOSAL SITE

	Round 1 11/12/86 761	Round 1 11/12/86 762 (Duplicate)	Round 2 12/13/86 656
601 Results (ug/l)			
Chloromethane	ND	ND	ND
Bromomethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
Chloroethane	ND	ND	ND
Methylene chloride	20 a	17 a	ND
Trichlorofluoromethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
Chloroform	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Bromodichloromethane	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Trichloroethene	770	700	790
Dibromochloromethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
2-Chloroethylvinyl ether	ND	ND	ND
Bromoform	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
Chlorobenzene	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Detection limit factor:	10	10	10
Surrogate Recovery, %	99	103	67
Analysis Date:	11/17/86	11/17/86	12/22/86
8020 Results (ug/l)			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Total Xylenes	ND	ND	ND
Detection limit factor:	10	10	10
Surrogate Recovery, %	99	103	65
Analysis Date:	11/17/86	11/17/86	12/23/86

	Round 1 11/12/86 761	Round 1 11/12/86 762 (Duplicate)	Round 2 12/13/86 656
Alkalinity Results (mg/l)			
Bicarbonate Alk., as CaCO3	68	71	64
Carbonate Alk., as CaCO3	ND	ND	ND
Hydroxide Alk., as CaCO3	ND	ND	ND
Analysis date:	11/12/86	11/21/86	12/1?/86
429 Results (mg/l)			
Bromide	0.1	0.1	ND
Chloride	3.3	3.2	3.4
Fluoride	0.2	0.2	0.2
Nitrate, as N	2.3	2.3	2.7 *
Nitrite, as N	ND	ND	ND *
Phosphate, as P	ND	ND	ND
Sulfate	4	3.9	4.2
Detection limit factor:	1	1	1
Analysis date:	11/13/86	11/13/86	12/16/86
Total Dissolved Solids (mg/l)	130	130	190
Detection limit factor:	1	1	1
Analysis date:	11/13/86	11/13/86	12/15/86
Mineral Results (mg/l)			
Calcium, Ca	16	16	16
Iron, Fe	0.032	0.036	0.22
Magnesium, Mg	5.4	5.4	5.4
Manganese, Mn	0.003	0.005	ND
Potassium, K	1.1	1.2	2.1
Sodium, Na	8.6	9.1	9.1
Detection limit factor:	1	1	1
Analysis date (ICP):	01/20/87	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

Footnotes:

a: below normal laboratory background

q: confirmation not performed

(Note: these definitions are not repeated on subsequent tables)

* Data for nitrate/nitrite invalid, holding time exceeded

TABLE N-2. Groundwater sampling results for Well MAFB-02 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/12/86 764	Round 2 12/14/86 658	Round 2 12/14/86 659 (Duplicate)
601 Results (ug/l)			
Chloromethane	ND	ND	ND
Bromomethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
Chloroethane	ND	ND	ND
Methylene chloride	10 a	ND	ND
Trichlorofluoromethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
Chloroform	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Bromodichloromethane	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Trichloroethene	23	25	35
Dibromochloromethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
2-Chloroethylvinyl ether	ND	ND	ND
Bromoform	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
Chlorobenzene	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Detection limit factor:	5	2.5	1
Surrogate Recovery, %	107	98	101
Analysis Date:	11/17/86	12/23/86	12/23/86
8020 Results (ug/l)			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Total Xylenes	ND	ND	ND
Detection limit factor:	5	2.5	1
Surrogate Recovery, %	107	[illegible]	[illegible]
Analysis Date:	11/17/86	12/23/86	12/23/86

	Round 1 11/12/86 764	Round 2 12/14/86 658	Round 2 12/14/86 659 (Duplicate)
Alkalinity Results (mg/l)			
Bicarbonate Alk., as CaCO3	120	140	140
Carbonate Alk., as CaCO3	ND	ND	ND
Hydroxide Alk., as CaCO3	ND	ND	ND
Analysis date:	11/21/86	12/17/86	12/17/86
429 Results (mg/l)			
Bromide	0.1	ND	ND
Chloride	8.5	6	6
Fluoride	0.3	0.2	0.2
Nitrate, as N	1.9	1.8	1.8
Nitrite, as N	ND	ND	ND
Phosphate, as P	ND	ND	ND
Sulfate	29	18	18
Detection limit factor:	1	1	1
Analysis date:	11/13/86	12/16/86	12/16/86
Total Dissolved Solids (mg/l)	230	210	210
Detection limit factor:	1	1	1
Analysis started:	11/13/86	12/15/86	12/15/86
Mineral Results (mg/l)			
Calcium, Ca	12	13	14
Iron, Fe	1	0.02	0.04
Magnesium, Mg	5.4	5.6	5.5
Manganese, Mn	0.15	0.13	0.12
Potassium, K	1.9	1.7	1.5
Sodium, Na	47	30	30
Detection limit factor	1	1	1
Analysis date (ICP)	01/20/87	01/21/87	01/21/87
Analysis date (K)	01/19/87	01/19/87	01/19/87

TABLE N-3. Groundwater sampling results for Well MAFB-03 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/11/86 758	Round 2 12/14/86 661
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	110 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	90	130
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2-Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	50	2.5
Surrogate Recovery, %	123	92
Analysis Date:	11/17/86	12/23/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	50	2.5
Surrogate Recovery, %	123	88
Analysis Date:	11/17/86	12/23/86

	Round 1 11/11/86 758	Round 2 12/14/86 661
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	26	47
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.1	ND
Chloride	4.4	3.4
Fluoride	0.5	0.4
Nitrate, as N	3.9	4.1
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	3.2	1.6
Detection limit factor:	1	1
Analysis date:	11/12/86	12/16/86
Total Dissolved Solids (mg/l)	120	110
Detection limit factor:	1	1
Analysis date:	11/12/86	12/15/86
Mineral Results (mg/l)		
Calcium, Ca	6.2	9.8
Iron, Fe	2.2	0.16
Magnesium, Mg	2.1	3.4
Manganese, Mn	0.58	0.55
Potassium, K	0.8	0.94
Sodium, Na	9.7	9.9
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-4. Groundwater sampling results for Well MAFB-07 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/17/86 792	Round 2 12/11/86 637
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	6.5 a	ND
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans 1,2 Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1 Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans 1,3 Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
2 Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	101	75
Analysis Date:	11/21/86	12/22/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	101	76
Analysis Date:	11/21/86	12/22/86

	Round 1 11/17/86 792	Round 2 12/11/86 637
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	460	440
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.6	0.6
Chloride	22	20
Fluoride	ND	ND
Nitrate, as N	0.6	0.7
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	260	240
Detection limit factor:	1	1
Analysis date:	11/18/86	12/12/86
Total Cyanides (mg/l)	ND	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	890	800
Detection limit factor:	1	1
Analysis started:	11/18/86	12/12/86
Metal Results (ug/l)		
Barium, Ba	150	99
Cadmium, Cd	ND	ND
Chromium, Cr	14	20
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/21/87
Mineral Results (mg/l)		
Calcium, Ca	120	140
Iron, Fe	5.1	6.3
Magnesium, Mg	65	58
Manganese, Mn	0.17	0.19
Potassium, K	2.2	[illegible]
Sodium, Na	29	28
Detection limit factor:	1	1
Analysis date (ICP):	[illegible]	[illegible]
Analysis date (K):	[illegible]	[illegible]

TABLE N-5. Groundwater sampling results for Well MAFB-08 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/16/86 787	Round 2 12/09/86 614
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane 4	ND	ND
Vinyl chloride 4	0.7	2.1
Chloroethane	ND	ND
Methylene chloride	ND	ND
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans 1,2 Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1 Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropane	ND	ND
trans 1,3 Dichloropropene	ND	ND
Trichloroethene	2.6	11
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
2 Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane 2	ND	ND
Tetrachloroethene 2	ND	1.4
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	71	124
Analysis Date:	11/21/86	12/12/86
8020 Results (ug/l)		
Benzene	1.0	1.5
Chlorobenzene	0.7	0.7
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor	1	1
Surrogate Recovery, %	71	124
Analysis Date:	11/21/86	12/12/86

	Round 1 11/16/86 787	Round 2 12/09/86 614
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	110	250
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	0.3	0.4
Chloride	14	16
Fluoride	ND	ND
Nitrate, as N	0.4	1.1
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	48	180
Detection limit factor:	1	1
Analysis date:	11/17/86	12/10/86
Total Cyanides (mg/l)	ND	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	190	560
Detection limit factor:	1	1
Analysis started:	11/17/86	12/10/86
Metal Results (ug/l)		
Barium, Ba	91	63
Cadmium, Cd	ND	ND
Chromium, Cr	20	14
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87
Mineral Results (mg/l)		
Calcium, Ca	25	81
Iron, Fe	0.11	1.2
Magnesium, Mg	14	43
Manganese, Mn	0.098	0.16
Potassium, K	1.9	2.3
Sodium, Na	18	22
Detection limit factor:	1	1
Analysis date (ICP)	01/20/87	01/20/87
Analysis date (K)	01/19/87	01/19/87

TABLE N-6. Groundwater sampling results for Well MAFB-09 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/16/86 789	Round 2 12/11/86 631
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.6 a	ND
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1-Trichloroethane	1.0	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	0.9	3.8
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2 Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane b	ND	ND
Tetrachloroethene b	ND	1.0
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	74	99
Analysis Date:	11/20/86	12/22/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	8.4	ND
Total Xylenes	4.0	ND
Detection limit factor:	1	1
Surrogate Recovery, %	74	99
Analysis Date:	11/20/86	12/22/86

	Round 1 11/16/86 789	Round 2 12/11/86 631
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	350	340
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.2	0.2
Chloride	19	19
Fluoride	ND	ND
Nitrate, as N	5.8	3.3
Nitrite, as N	ND	0.7
Phosphate, as P	ND	ND
Sulfate	200	210
Detection limit factor:	1	1
Analysis date:	11/17/86	12/12/86
Total Cyanides (mg/l)	ND	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	730	710
Detection limit factor:	1	1
Analysis started:	11/17/86	12/12/86
Metal Results (ug/l)		
Barium, Ba	190	220
Cadmium, Cd	ND	ND
Chromium, Cr	21	20
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/21/87
Mineral Results (mg/l)		
Calcium, Ca	100	120
Iron, Fe	1.5	9.4
Magnesium, Mg	[illegible]	51
Manganese, Mn	0.14	0.18
Potassium, K	2	2
Sodium, Na	28	29
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/1[illegible]/87

TABLE N-7. Groundwater sampling results for Well MAFB-10 at Mather AFB, California - WEST DITCH

	Round 1 11/14/86 771	Round 2 12/08/86 603
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	8.8 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2-Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	104	106
Analysis Date:	11/19/86	12/11/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	104	106
Analysis Date:	11/19/86	12/11/86

	Round 1 11/14/86 771	Round 2 12/08/86 603
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	73	76
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/09/86
429 Results (mg/l)		
Bromide	0.2	0.2
Chloride	12	10
Fluoride	ND	ND
Nitrate, as N	0.6	0.6
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	3.9	5
Detection limit factor:	1	1
Analysis date:	11/16/86	12/09/86
Total Dissolved Solids (mg/l)	120	130
Detection limit factor:	1	1
Analysis started:	11/15/86	12/09/86
Mineral Results (mg/l)		
Calcium, Ca	15	14
Iron, Fe	0.062	0.044
Magnesium, Mg	7.4	7.7
Manganese, Mn	0.04	0.007
Potassium, K	1.4	1.7
Sodium, Na	10	11
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-8. Groundwater sampling results for Well MAFB-11 at Mather AFB, California - WEST DITCH

	Round 1 11/13/86 768	Round 2 12/08/86 604
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.3 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2-Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	112	103
Analysis Date:	11/18/86	12/11/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	112	103
Analysis Date:	11/18/86	12/11/86

	Round 1 11/13/86 768	Round 2 12/08/86 604
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	77	68
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/09/86
429 Results (mg/l)		
Bromide	ND	0.2
Chloride	21	23
Fluoride	ND	ND
Nitrate, as N	0.5	0.5
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	5.5	7.9
Detection limit factor:	1	1
Analysis date:	11/14/86	12/09/86
Total Dissolved Solids (mg/l)	120	180
Detection limit factor:	1	1
Analysis started:	11/14/86	12/09/86
Mineral Results (mg/l)		
Calcium, Ca	18	18
Iron, Fe	0.072	0.099
Magnesium, Mg	8.8	9.4
Manganese, Mn	0.1	0.091
Potassium, K	1.2	1.3
Sodium, Na	10	11
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-9. Groundwater sampling results for Well MAFB-40 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/17/86 795	Round 2 12/09/86 612
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	0.9 a	0.6 a
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans 1,2 Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1 Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropene	ND	ND
trans 1,3 Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	81	101
Analysis Date:	11/21/86	12/11/86
8020 Results (ug/l)		
Benzene	ND	1.1
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	81	101
Analysis Date	11/21/86	12/12/86

	Round 1 11/17/86 795	Round 2 12/09/86 612
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	51	58
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	ND	0.4
Chloride	3.7	3.9
Fluoride	0.1	0.2
Nitrate, as N	2.7	ND
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	2	2
Detection limit factor:	1	1
Analysis date:	11/18/86	12/10/86
Total Cyanides (mg/l)	ND	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	120	72
Detection limit factor:	1	1
Analysis started:	11/18/86	12/10/86
Metal Results (ug/l)		
Barium, Ba	87	34
Cadmium, Cd	ND	[illegible]
Chromium, Cr	36	21
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87
Mineral Results (mg/l)		
Calcium, Ca	8.9	8.6
Iron, Fe	0.16	0.02
Magnesium, Mg	[illegible]	[illegible]
Manganese, Mn	0.017	ND
Potassium, K	0.85	1.8
Sodium, Na	[illegible]	[illegible]
Detection limit factor	1	1
Analysis date (Ca,Fe)	01/20/87	01/20/87
Analysis date (K)	01/19/87	01/14/87

TABLE IV-12. Groundwater sampling results for Well MAFB-41 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/18/86 298	Round 1 11/18/86 299 (Duplicate)	Round 2 12/11/86 634
601 Results (ug/l)			
Chloromethane	ND	ND	ND
Bromomethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Vinyl chloride	9.9	9.4	1.0
Chloroethane	ND	ND	ND
Methylene chloride	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND
1,1 Dichloroethane	0.9	0.9	ND
trans 1,2 Dichloroethene	ND	ND	ND
Chloroform	ND	ND	ND
1,2 Dichloroethane	2.5	2.8	ND
1,1,1 Trichloroethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Bromodichloromethane	ND	ND	ND
1,2 Dichloropropane	1.0	1.2	ND
trans 1,3 Dichloropropene	ND	ND	ND
Trichloroethene	22	21	7.0
Dibromochloromethane	ND	ND	ND
1,1,2 Trichloroethane	ND	ND	ND
cis 1,3 Dichloropropene	ND	ND	ND
Chloroethylvinyl ether	ND	ND	ND
Bromoform	ND	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND	ND
Tetrachloroethene	2.7	2.6	0.6
Chlorobenzene	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	110	102	99
Analysis Date:	11/24/86	11/24/86	12/22/86
8020 Results (ug/l)			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2 Dichlorobenzene	3.3	3.0	ND
1,3 Dichlorobenzene	ND	ND	ND
1,4 Dichlorobenzene	3.3	3.0	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Total Xylenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	110	102	97
Analysis Date:	11/24/86	11/24/86	12/22/86

	Round 1 11/18/86 298	Round 1 11/18/86 299 (Duplicate)	Round 2 12/11/86 634
Atomic Absorption Metal Results (ug/l)			
Arsenic, As	ND	ND	ND
Mercury, Hg	ND	ND	ND
Selenium, Se	ND	ND	ND
Detection limit factor:	1.00	1.00	1.00
Analysis date (As,Hg):	11/16/86	11/16/86	12/17/86
Analysis date (Se):	12/01/86	12/01/86	12/17/86
Alkalinity Results (mg/l)			
Bicarbonate Alk., as CaCO3	150	150	85
Carbonate Alk., as CaCO3	ND	ND	ND
Hydroxide Alk., as CaCO3	ND	ND	ND
Analysis date:	11/21/86	11/21/86	12/17/86
429 Results (ug/l)			
Bromide	0.6 q	0.6 q	0.2
Chloride	7.4 q	7.9 q	4.9
Fluoride	ND q	0.2 q	0.2
Nitrate, as N	1.4 q *	1.5 q *	2
Nitrite, as N	ND q *	ND q *	ND
Phosphate, as P	ND q	ND q	ND
Sulfate	46 q	47 q	17
Detection limit factor:	1	1	1
Analysis date:	11/21/86	11/21/86	12/12/86
Total Cyanides (mg/l)	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date:	11/26/86	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	260 q *	260 q *	170
Detection limit factor:	1	1	1
Analysis started:	11/21/86	11/21/86	12/12/86
Metal Results (ug/l)			
Barium, Ba	110	53	46
Cadmium, Cd	ND	ND	ND
Chromium, Cr	21	17	20
Lead, Pb	ND	ND	ND
Silver, Ag	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date (Ba):	01/21/87	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87	01/21/87
Mineral Results (mg/l)			
Calcium, Ca	17	17	20
Iron, Fe	0.32	0.29	0.074
Magnesium, Mg	17	17	9.2
Manganese, Mn	0.11	0.13	0.042
Potassium, K	1.6	1.4	1.1
Sodium, Na	15	16	11
Detection limit factor	1	1	1
Analysis date (ICP)	01/20/87	01/20/87	01/21/87
Analysis date (K)	[illegible]	[illegible]	[illegible]

* Data invalid, holding time exceeded

TABLE N-11. Groundwater sampling results for Well MAFB-42 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/18/86 796	Round 2 12/11/86 632
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.4 a	ND
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans 1,2 Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1 Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropane	ND	ND
trans 1,3 Dichloropropene	ND	ND
Trichloroethene	13	17.0
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND
Tetrachloroethene	1.6	2.7
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	75	94
Analysis Date:	11/21/86	12/22/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzen	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	75	94
Analysis Date:	11/21/86	12/22/86

	Round 1 11/18/86 796	Round 2 12/11/86 632
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	56	210
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.3	0.7
Chloride	24	17
Fluoride	0.3	0.4
Nitrate, as N	0.7	0.7
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	100	50
Detection limit factor:	1	1
Analysis date:	11/19/86	12/12/86
Total Cyanides (mg/l)	ND	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	890	350
Detection limit factor:	1	1
Analysis started:	11/19/86	12/12/86
Metal Results (ug/l)		
Barium, Ba	120	51
Cadmium, Cd	ND	ND
Chromium, Cr	22	19
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/21/87
Mineral Results (mg/l)		
Calcium, Ca	44	44
Iron, Fe	0.76	1.5
Magnesium, Mg	25	24
Manganese, Mn	0.61	0.37
Potassium, K	3	4.1
Sodium, Na	56	31
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-12. Groundwater sampling results for Well MAFB-43 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/17/86 [illegible]0	Round 1 11/17/86 791 (Duplicate)	Round 2 12/11/86 638
601 Results (ug/l)			
Chloromethane	ND	ND	ND
Bromomethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
Chloroethane	ND	ND	ND
Methylene chloride	ND	3.0 a	ND
Trichlorofluoromethane	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND
1,1 Dichloroethane	ND	ND	ND
trans 1,2 Dichloroethene	ND	ND	ND
Chloroform	ND	ND	ND
1,2 Dichloroethane	ND	ND	ND
1,1,1 Trichloroethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Bromodichloromethane	ND	ND	ND
1,2 Dichloropropane	ND	ND	ND
trans 1,3 Dichloropropene	ND	ND	ND
Trichloroethene	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,1,2 Trichloroethane	ND	ND	ND
cis 1,3 Dichloropropene	ND	ND	ND
Chloroethylvinyl ether	ND	ND	ND
Bromoform	ND	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
Chlorobenzene	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	85	77	95
Analysis Date:	11/20/86	11/21/86	12/16/86
8020 Results (ug/l)			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2 Dichlorobenzene	ND	ND	ND
1,3 Dichlorobenzene	ND	ND	ND
1,4 Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	2.8	2.0	ND
Total Xylenes	1.0	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery %	85	77	95
Analysis Date:	11/20/86	11/21/86	12/16/86

	Round 1 11/17/86 790	Round 1 11/17/86 791 (Duplicate)	Round 2 12/11/86 638
Atomic Absorption Metal Results (ug/l)			
Arsenic, As	ND	ND	ND
Mercury, Hg	ND	ND	ND
Selenium, Se	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date (As,Hg):	11/26/86	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/01/86	12/17/86
Alkalinity Results (ug/l)			
Bicarbonate Alk., as CaCO3	60	60	41
Carbonate Alk., as CaCO3	8	8	12
Hydroxide Alk., as CaCO3	ND	ND	ND
Analysis date:	11/21/86	11/21/86	12/17/86
429 Results (mg/l)			
Bromide	0.1	0.1	0.6
Chloride	3.8	4	3.4
Fluoride	0.2	0.2	0.2
Nitrate, as N	1.3	1.4	ND
Nitrite, as N	ND	ND	ND
Phosphate, as P	ND	ND	ND
Sulfate	2.4	2.5	2
Detection limit factor:	1	1	1
Analysis date:	11/18/86	11/18/86	12/12/86
Petroleum Hydrocarbons (mg/l)	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date:	11/21/86	11/21/86	12/18/86
Total Cyanides (mg/l)	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date:	11/26/86	11/26/86	12/19/86
Total Phenols (mg/l)	0.024	0.046	ND
Detection limit factor	1	1	1
Analysis date:	11/25/86	11/25/86	12/16/86
Total Dissolved Solids (mg/l)	100	100	78
Detection limit factor:	1	1	1
Analysis started:	11/18/86	11/18/86	12/12/86
Metal Results (ug/l)			
Barium, Ba	88	19	110
Cadmium, Cd	ND	ND	ND
Chromium, Cr	18	20	20
Lead, Pb	ND	ND	ND
Silver, Ag	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date (Ba)	01/21/87	01/21/87	01/21/87
Analysis date (Others)	01/20/87	01/20/87	01/21/87
Mineral Results (mg/l)			
Calcium, Ca	5.5	5.5	5.1
Iron, Fe	0.057	0.014	0.1[illegible]
Magnesium, Mg	1.8	1.8	1.8
Manganese, Mn	ND	ND	ND
Potassium, K	5.1	5.2	4.2
Sodium, Na	19	18	15
Detection limit factor:	1	1	1
Analysis date [illegible]	01/20/87	01/20/87	[illegible]
Analysis date [illegible]	[illegible]	[illegible]	[illegible]

TABLE N-13. Groundwater sampling results for Well MAFB-44 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/17/86 793	Round 2 12/12/86 639
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	ND	ND
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans 1,2 Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1 Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropane	ND	ND
trans 1,3 Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	66	110
Analysis Date:	11/21/86	12/18/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	66	96
Analysis Date:	11/21/86	12/18/86

	Round 1 11/17/86 793	Round 2 12/12/86 639
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	310	380
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.3	0.2
Chloride	29	28
Fluoride	ND	0.2
Nitrate, as N	5.8	ND
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	10	6.2
Detection limit factor:	1	1
Analysis date:	11/18/86	12/14/86
Total Cyanides (mg/l)	ND	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	420	380
Detection limit factor:	1	1
Analysis started:	11/18/86	12/14/86
Metal Results (ug/l)		
Barium, Ba	140	200
Cadmium, Cd	ND	ND
Chromium, Cr	18	15
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/21/87
Mineral Results (mg/l)		
Calcium, Ca	74	68
Iron, Fe	3.7	11
Magnesium, Mg	33	33
Manganese, Mn	0.26	0.21
Potassium, K	2.1	1.9
Sodium, Na	24	23
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-14. Groundwater sampling results for Well MAFB-45 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/15/86 784	Round 2 12/12/86 640	 641 duplicated
601 Results (ug/l)			
Chloromethane	ND	ND	ND
Bromomethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
Chloroethane	ND	ND	ND
Methylene chloride	18 a	ND	ND
Trichlorofluoromethane	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND
1,1 Dichloroethane	ND	ND	ND
trans 1,2 Dichloroethene	ND	ND	ND
Chloroform	ND	ND	ND
1,2 Dichloroethane	ND	ND	ND
1,1,1 Trichloroethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Bromodichloromethane	ND	ND	ND
1,2 Dichloropropane	ND	ND	ND
trans 1,3 Dichloropropene	ND	ND	ND
Trichloroethene	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,1,2 Trichloroethane	ND	ND	ND
cis 1,3 Dichloropropene	ND	ND	ND
Chloroe /lvinyl ether	ND	ND	ND
Bromoform	ND	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
Chlorobenzene	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	85	72	67
Analysis Date:	11/20/86	12/18/86	12/18/86
8020 Results (ug/l)			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2 Dichlorobenzene	ND	ND	ND
1,3 Dichlorobenzene	ND	ND	ND
1,4 Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Total Xylenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	85	69	70
Analysis Date:	11/20/86	12/18/86	12/18/86

	Round 1 11/15/86 784	Round 2 12/12/86 640	 641 duplicated
Atomic Absorption Metal Results (ug/l)			
Arsenic, As	ND	ND	ND
Mercury, Hg	ND	ND	ND
Selenium, Se	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date (As,Hg):	11/26/86	12/17/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86	12/17/86
Alkalinity Results (mg/l)			
Bicarbonate Alk., as CaCO3	240	220	160
Carbonate Alk., as CaCO3	ND	ND	ND
Hydroxide Alk., as CaCO3	ND	ND	ND
Analysis date:	11/21/86	12/17/86	12/17/86
429 Results (mg/l)			
Bromide	0.2	0.2	0.2
Chloride	22	22	21
Fluoride	0.2	0.2	0.2
Nitrate, as N	0.3 *	0.8	0.8
Nitrite, as N	ND *	ND	ND
Phosphate, as P	ND	ND	ND
Sulfate	5.8	5.3	5.2
Detection limit factor:	1	1	1
Analysis date:	11/18/86	12/14/86	12/14/86
Total Cyanides (mg/l)	0.02	ND	ND
Detection limit factor:	1	1	1
Analysis date:	11/26/86	12/19/86	12/19/86
Total Dissolved Solids (mg/l)	290	300	280
Detection limit factor:	1	1	1
Analysis started:	11/17/86	12/14/86	12/14/86
Metal Results (ug/l)			
Barium, Ba	500	220	100
Cadmium, Cd	ND	ND	ND
Chromium, Cr	20	16	13
Lead, Pb	ND	ND	ND
Silver, Ag	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date (Ba):	01/21/87	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/21/87	01/21/87
Mineral Results (mg/l)			
Calcium, Ca	46	43	45
Iron, Fe	1.4	0.18	0.17
Magnesium, Mg	22	23	24
Manganese, Mn	0.55	0.093	0.097
Potassium, K	2.1	1.7	1.8
Sodium, Na	19	18	18
Detection limit factor	1	1	1
Analysis date (ICP):	01/20/87	01/21/87	01/21/87
Analysis date (K)	01/19/87	01/19/87	01/19/87

* Data for nitrate/nitrite invalid, holding time exceeded

TABLE .N-15. Groundwater sampling results for Well MAFB-46 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/16/86 785	Round 2 12/09/86 610
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	2.3 a	ND
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans 1,2 Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1 Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropane	ND	ND
trans 1,3 Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	91	127
Analysis Date:	11/20/86	12/11/86
8020 Results (ug/l)		
Benzene	0.9	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	7.8	ND
Total Xylenes	4.0	ND
Detection limit factor:	1	1
Surrogate Recovery, %	91	127
Analysis Date:	11/20/86	12/11/86

	Round 1 11/16/86 785	Round 2 12/09/86 610
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	130	170
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	0.2	0.2
Chloride	12	14
Fluoride	0.1	ND
Nitrate, as N	2.6	3.2
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	8.9	9.6
Detection limit factor:	1	1
Analysis date:	11/17/86	12/10/86
Total Cyanides (mg/l)	ND	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	230	260
Detection limit factor:	1	1
Analysis started:	11/17/86	12/10/86
Metal Results (ug/l)		
Barium, Ba	120	100
Cadmium, Cd	ND	ND
Chromium, Cr	13	20
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87
Mineral Results (mg/l)		
Calcium, Ca	11	[illegible]
Iron, Fe	0.08	[illegible]
Magnesium, Mg	15	16
Manganese, Mn	0.18	0.031
Potassium, K	1.7	2
Sodium, Na	15	15
Detection limit factor:	1	1
Analysis date [illegible]	01/20/87	01/20/87
Analysis date [illegible]	[illegible]	[illegible]

TABLE N-16. Groundwater sampling results for Well MAFB-47 at Mather AFB, California - WEST DITCH

	Round 1 11/14/86 773	Round 2 12/09/86 607	Round 2 12/09/86 608 duplicate
601 Results (ug/l)			
Chloromethane	ND	ND	ND
Bromomethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
Chloroethane	ND	ND	ND
Methylene chloride	0.7 a	ND	1.1 a
Trichlorofluoromethane	ND	ND	ND
1,1 Dichloroethene	1.3	ND	ND
1,1 Dichloroethane	2.4	ND	0.9
trans 1,2 Dichloroethene	ND	ND	ND
Chloroform	ND	ND	ND
1,2 Dichloroethane	ND	ND	ND
1,1,1 Trichloroethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Bromodichloromethane	ND	ND	ND
1,2 Dichloropropane	ND	ND	ND
trans 1,3 Dichloropropene	ND	ND	ND
Trichloroethene	7.6	36	64
Dibromochloromethane	ND	ND	ND
1,1,2 Trichloroethane	ND	ND	ND
cis 1,3 Dichloropropene	ND	ND	ND
Chloroethylvinyl ether	ND	ND	ND
Bromoform	ND	ND	ND
1,1,2,2 Tetrachloroethane	ND	NL	ND
Tetrachloroethene	2.5	7.7	18
Chlorobenzene	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	58	138	119
Analysis Date.	11/18/86	12/19/86	12/11/86
8020 Results (ug/l)			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2 Dichlorobenzene	ND	ND	ND
1,3 Dichlorobenzene	ND	ND	ND
1,4 Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Total Xylenes	ND	ND	ND
Detection limit factor:	[illegible]	[illegible]	[illegible]
Surrogate Recovery, %	[illegible]	[illegible]	[illegible]
Analysis Date.	[illegible]	[illegible]	[illegible]

	Round 1 11/14/86 773	Round 2 12/09/86 607	Round 2 12/09/86 608 duplicate
Alkalinity Results (mg/l)			
Bicarbonate Alk., as CaCO3	170	99	130
Carbonate Alk., as CaCO3	ND	ND	ND
Hydroxide Alk., as CaCO3	ND	ND	ND
Analysis date:	11/21/86	12/16/86	12/16/86
429 Results (mg/l)			
Bromide	0.1	0.2	0.2
Chloride	7.4	6.7	6.8
Fluoride	0.1	ND	ND
Nitrate, as N	4.4	4	4
Nitrite, as N	ND	ND	ND
Phosphate, as P	ND	ND	ND
Sulfate	6.2	6.3	6.2
Detection limit factor:	1	1	1
Analysis date:	11/16/86	12/10/86	12/10/86
Total Dissolved Solids (mg/l)	210	190	190
Detection limit factor:	1	1	1
Analysis started:	11/15/86	12/10/86	12/10/86
Mineral Results (mg/l)			
Calcium, Ca	25	21	20
Iron, Fe	0.089	0.14	0.14
Magnesium, Mg	13	11	11
Manganese, Mn	0.086	0.062	0.061
Potassium, K	1.6	1.6	1.4
Sodium, Na	13	12	13
Detection limit factor:	1	1	1
Analysis date (ICP):	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

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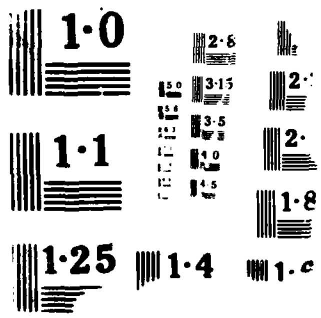
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TABLE N-17. Groundwater sampling results for Well MAFB-48 at Mather AFB, California - WEST DITCH

	Round 1 11/13/86 767	Round 2 12/08/86 601
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	0.8 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropane	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	74	105
Analysis Date:	11/18/86	12/11/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	74	105
Analysis Date:	11/18/86	12/11/86

	Round 1 11/13/86 767	Round 2 12/08/86 601
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	56	51
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/09/86
429 Results (mg/l)		
Bromide	ND	ND
Chloride	6	5.8
Fluoride	0.2	0.2
Nitrate, as N	2.6	2.9
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	6.7	7
Detection limit factor:	1	1
Analysis date:	11/14/86	12/09/86
Total Dissolved Solids (mg/l)	140	160
Detection limit factor:	1	1
Analysis started:	11/14/86	12/10/86
Mineral Results (mg/l)		
Calcium, Ca	8.9	8.9
Iron, Fe	0.28	0.024
Magnesium, Mg	5.3	5.3
Manganese, Mn	0.12	0.12
Potassium, K	1.6	1.7
Sodium, Na	16	14
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-18. Groundwater sampling results for Well MAFB-49 at Mather AFB, California - WEST DITCH

	Round 1 11/15/86 783	Round 2 12/12/86 642
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	15.0 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	82	58
Analysis Date:	11/19/86	12/18/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	82	61
Analysis Date:	11/19/86	12/18/86

	Round 1 11/15/86 783	Round 2 12/12/86 642
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	45	39
Carbonate Alk., as CaCO3	18	12
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	ND	0.4
Chloride	3.3	3.2
Fluoride	0.2	0.2
Nitrate, as N	0.9	0.7
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	3.7	2.9
Detection limit factor:	1	1
Analysis date:	11/17/86	12/14/86
Total Dissolved Solids (mg/l)	86	84
Detection limit factor:	1	1
Analysis started:	11/17/86	12/14/86
Mineral Results (mg/l)		
Calcium, Ca	9.6	9.8
Iron, Fe	0.035	0.92
Magnesium, Mg	1.5	3.5
Manganese, Mn	ND	0.005
Potassium, K	3.5	2.9
Sodium, Na	15	10
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-19. Groundwater sampling results for Well MAFB-50 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/12/86 763	Round 2 12/13/86 651	Round 2 12/13/86 652 (Duplicate)
601 Results (ug/l)			
Chloromethane	ND	ND	ND
Bromomethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
Chloroethane	ND	ND	ND
Methylene chloride	0.7 a	1.0 a	1.2 a
Trichlorofluoromethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
Chloroform	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Bromodichloromethane	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Trichloroethene	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
Chloroethylvinyl ether	ND	ND	ND
Bromoform	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
Chlorobenzene	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	90	95	77
Analysis Date:	11/17/86	12/19/86	12/19/86
8020 Results (ug/l)			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Total Xylenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	98	95	83
Analysis Date:	11/17/86	12/19/86	12/19/86

	Round 1 11/12/86 763	Round 2 12/13/86 651	Round 2 12/13/86 652 (Duplicate)
Alkalinity Results (mg/l)			
Bicarbonate Alk., as CaCO3	49	49	47
Carbonate Alk., as CaCO3	ND	ND	ND
Hydroxide Alk., as CaCO3	ND	ND	ND
Analysis date:	11/21/86	12/17/86	12/17/86
429 Results (mg/l)			
Bromide	0.1	ND	ND
Chloride	3.6	3.2	3.1
Fluoride	0.3	0.2	0.3
Nitrate, as N	2.9	3.2 *	3.4 *
Nitrite, as N	ND	ND *	ND *
Phosphate, as P	ND	ND	ND
Sulfate	3.7	2.6	2.8
Detection limit factor:	1	1	1
Analysis date:	11/13/86	12/16/86	12/16/86
Total Dissolved Solids (ug/l)	130	140	140
Detection limit factor:	1	1	1
Analysis started:	11/13/86	12/15/86	12/15/86
Mineral Results (mg/l)			
Calcium, Ca	7.3	7.6	7.5
Iron, Fe	0.19	0.033	0.17
Magnesium, Mg	3.4	3.5	3.5
Manganese, Mn	0.11	0.13	0.12
Potassium, K	1.4	1.5	1.4
Sodium, Na	16	13	14
Detection limit factor:	1	1	1
Analysis date (ICP):	01/20/87	01/21/87	01/21/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

* Data for nitrate/nitrite invalid, holding time exceeded

TABLE N-20. Groundwater sampling results for Well MAFB-51 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/10/86 751	Round 2 12/13/86 653
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.1 a	1.0 a
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	83	72
Analysis Date:	11/14/86	12/19/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	83	75
Analysis Date:	11/14/86	12/19/86

	Round 1 11/10/86 751	Round 2 12/13/86 653
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	47	59
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.2	ND
Chloride	3.8	3.5
Fluoride	0.2	0.2
Nitrate, as N	3.2	3 *
Nitrite, a	ND	ND *
Phosphate	ND	ND
Sulfate	2.5	2.1
Detection limit factor:	1	1
Analysis date:	11/12/86	12/16/86
Total Dissolved Solids (mg/l)	170	120
Detection limit factor:	1	1
Analysis started:	11/12/86	12/15/86
Mineral Results (mg/l)		
Calcium, Ca	8.3	11
Iron, Fe	0.037	0.018
Magnesium, Mg	4.4	4.8
Manganese, Mn	0.06	0.013
Potassium, K	1.7	5.4
Sodium, Na	11	11
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

* Data for nitrate/nitrite invalid, holding time exceeded

TABLE N-21. Groundwater sampling results for Well MAFB-52 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/10/86 752	Round 2 12/12/86 644
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.0 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Tichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	4.1	5.7
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	103	73
Analysis Date:	11/17/86	12/22/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	103	73
Analysis Date:	11/17/86	12/22/86

	Round 1 11/10/86 752	Round 2 12/12/86 644
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	67	59
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.4	ND
Chloride	5.9	4.7
Fluoride	0.3	0.2
Nitrate, as N	3.6	4
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	6.7	4.3
Detection limit factor:	1	1
Analysis date:	11/12/86	12/14/86
Total Dissolved Solids (mg/l)	190	200
Detection limit factor:	1	1
Analysis started:	11/12/86	12/14/86
Mineral Results (mg/l)		
Calcium, Ca	11	12
Iron, Fe	0.074	0.075
Magnesium, Mg	4.7	4.7
Manganese, Mn	0.008	0.014
Potassium, K	2.6	1.9
Sodium, Na	19	14
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-22. Groundwater sampling results for Well MAFB-53 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/11/86 754	Round 2 12/12/86 645
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.6 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethane	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	81	55
Analysis Date:	11/14/86	12/22/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	2.1	1.3
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	81	61
Analysis Date:	11/14/86	12/22/86

	Round 1 11/11/86 754	Round 2 12/12/86 645
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	43	47
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	ND	0.5
Chloride	7.7	3.7
Fluoride	0.5	0.3
Nitrate, as N	0.3	1
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	5.7	2.1
Detection limit factor:	1	1
Analysis date:	11/12/86	12/14/86
Total Dissolved Solids (mg/l)	100	68
Detection limit factor:	1	1
Analysis started:	11/12/86	12/14/86
Mineral Results (mg/l)		
Calcium, Ca	7.8	7.7
Iron, Fe	0.11	0.02
Magnesium, Mg	3.1	3.3
Manganese, Mn	ND	ND
Potassium, K	2.6	2.3
Sodium, Na	14	10
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-23. Groundwater sampling results for Well MAFB-54 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/11/86 756	Round 2 12/13/86 649
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	ND	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	86	101
Analysis Date:	11/24/86	12/19/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	86	104
Analysis Date:	11/24/86	12/19/86

	Round 1 11/11/86 756	Round 2 12/13/86 649	
Alkalinity Results (mg/l)			
Bicarbonate Alk., as CaCO3	51	110	
Carbonate Alk., as CaCO3	ND	ND	
Hydroxide Alk., as CaCO3	ND	ND	
Analysis date:	11/21/86	12/17/86	
429 Results (mg/l)			
Bromide	0.1	0.2	
Chloride	3.2	2.9	
Fluoride	0.2	0.2	
Nitrate, as N	3.3	2.2	*
Nitrite, as N	ND	ND	*
Phosphate, as P	ND	ND	
Sulfate	3.5	4.3	
Detection limit factor:	1	1	
Analysis date:	11/12/86	12/16/86	
Total Dissolved Solids (mg/l)	150	130	
Detection limit factor:	1	1	
Analysis started:	11/12/86	12/15/86	
Mineral Results (mg/l)			
Calcium, Ca	8.5	10	
Iron, Fe	0.05	0.035	
Magnesium, Mg	4.5	4.3	
Manganese, Mn	0.022	0.009	
Potassium, K	1.9	2.9	
Sodium, Na	13	12	
Detection limit factor:	1	1	
Analysis date (ICP):	01/20/87	01/21/87	
Analysis date (K):	01/19/87	01/19/87	

* Data for nitrate/nitrite invalid, holding time exceeded

TABLE N-24. Groundwater sampling results for Well MAFB-55 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/17/86 794	Round 2 12/09/86 613
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	2.8 a	ND
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans 1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropane	ND	ND
trans 1,3 Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	110	109
Analysis Date:	11/21/86	12/12/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	110	109
Analysis Date:	11/21/86	[illegible]

	Round 1 11/17/86 794	Round 2 12/09/86 613
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	84	40
Carbonate Alk., as CaCO3	22	12
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (ug/l)		
Bromide	ND	0.5
Chloride	3.8	3.6
Fluoride	ND	ND
Nitrate, as N	0.8	ND
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	6	6
Detection limit factor:	1	1
Analysis date:	11/18/86	12/10/86
Total Cyanides (mg/l)	ND	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	150	98
Detection limit factor:	1	1
Analysis started:	11/18/86	12/10/86
Metal Results (ug/l)		
Barium, Ba	74	32
Cadmium, Cd	ND	ND
Chromium, Cr	21	18
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87
Mineral Results (mg/l)		
Calcium, Ca	[illegible]	[illegible]
Iron, Fe	[illegible]	[illegible]
Magnesium, Mg	[illegible]	[illegible]
Manganese, Mn	ND	ND
Potassium, K	[illegible]	[illegible]
Sodium, Na	[illegible]	[illegible]
Detection limit factor:	1	1
Analysis date [illegible]	[illegible]	[illegible]
Analysis date [illegible]	[illegible]	[illegible]

TABLE N-25. Groundwater sampling results for Well MAFB-56 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/18/86 800	Round 2 12/11/86 635
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.3 a	ND
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans 1,2 Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1 Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropane	ND	ND
trans 1,3 Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	77	102
Analysis Date:	11/21/86	12/22/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	77	101
Analysis Date:	11/21/86	[illegible]

	Round 1 11/18/86 800	Round 2 12/11/86 635
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	6	
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	[illegible]
Analysis date (Se):	12/01/86	[illegible]
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	ND	29
Carbonate Alk., as CaCO3	60	26
Hydroxide Alk., as CaCO3	34	ND
Analysis date:	11/21/86	[illegible]
429 Results (mg/l)		
Bromide	0.1 q	0.5
Chloride	6.8 q	4.5
Fluoride	0.5 q	0.2
Nitrate, as N	0.2 q *	0.8
Nitrite, as N	1.1 q *	0.4
Phosphate, as P	ND q	ND
Sulfate	65 q	21
Detection limit factor:	1	1
Analysis date:	11/21/86	12/12/86
Total Cyanides (mg/l)	0.02	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	[illegible]
Total Dissolved Solids (mg/l)	220 q *	140
Detection limit factor:	1	1
Analysis started:	11/21/86	12/12/86
Metal Results (ug/l)		
Barium, Ba	68	38
Cadmium, Cd	ND	ND
Chromium, Cr	20	19
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (others):	01/20/87	01/21/87
Mineral Results (mg/l)		
Calcium, Ca	23	10
Iron, Fe	0.028	0.017
Magnesium, Mg	0.16	0.08
Manganese, Mn	ND	ND
Potassium, K	[illegible]	[illegible]
Sodium, Na	45	[illegible]
Detection limit factor	1	1
Analysis date (Fe):	[illegible]	[illegible]
Analysis date (K):	[illegible]	[illegible]

* Data invalid, holding time exceeded

TABLE N-26. Groundwater sampling results for Well MAFB-57 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/10/86 797	Round 2 12/11/86 633
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.2 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans 1,2 Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1 Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropane	ND	ND
trans 1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	78	98
Analysis Date:	11/21/86	12/22/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	78	98
Analysis Date:	11/21/86	12/22/86

	Round 1 11/10/86 797	Round 2 12/11/86 633
Atomic Absorption Metal Results (mg/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1	1
Analysis date (As,Hg):	11/26/86	12/17/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	240	4[illegible]
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.1	0.3
Chloride	7.4	4.4
Fluoride	0.5	0.2
Nitrate, as N	1	1.1
Nitrite, as N	1	0.5
Phosphate, as P	ND	ND
Sulfate	19	14
Detection limit factor:	1	1
Analysis date:	11/19/86	12/12/86
Total Cyanides (mg/l)	0.025	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/19/86
Total Dissolved Solids (mg/l)	420	150
Detection limit factor:	1	1
Analysis started	11/19/86	12/12/86
Metal Results (ug/l)		
Barium, Ba	4[illegible]	27
Cadmium, Cd	ND	ND
Chromium, Cr	21	20
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor:	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/21/87
Mineral Results (mg/l)		
Calcium, Ca	[illegible]	[illegible]
Iron, Fe	[illegible]	[illegible]
Magnesium, Mg	[illegible]14	[illegible]
Manganese, Mn	ND	ND
Potassium, K	[illegible]	[illegible]
Sodium, Na	[illegible]	[illegible]
Detection limit factor:	[illegible]	[illegible]
Analysis date (Ba):	[illegible]	[illegible]
Analysis date (Others):	[illegible]	[illegible]

TABLE N-27. Groundwater sampling results for Well MAFB-58 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/16/86 788	Round 2 12/11/86 [illegible]	Round 2 12/11/86 [illegible] Duplicate
601 Results (ug/l)			
Chloromethane	ND	ND	ND
Bromomethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
Chloroethane	ND	ND	ND
Methylene chloride	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND
1,1 Dichloroethane	ND	ND	ND
trans 1,2 Dichloroethene	ND	ND	ND
Chloroform	ND	ND	ND
1,2 Dichloroethane	ND	ND	ND
1,1,1 Trichloroethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Bromodichloromethane	ND	ND	ND
1,2 Dichloropropane	ND	ND	ND
trans 1,3 Dichloropropene	ND	ND	ND
Trichloroethene	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,1,2 Trichloroethane	ND	ND	ND
cis 1,3 Dichloropropene	ND	ND	ND
Chloroethylvinyl ether	ND	ND	ND
Bromoform	ND	ND	ND
Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
Chlorobenzene	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	67	107	82
Analysis Date:	11/20/86	12/15/86	12/17/86
8020 Results (ug/l)			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2 Dichlorobenzene	ND	ND	ND
1,3 Dichlorobenzene	ND	ND	ND
1,4 Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	[illegible]	[illegible]	1.6
Total Xylenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	67	107	82
Analysis Date:	11/20/86	[illegible]	[illegible]

	Round 1 11/16/86 788	Round 2 12/11/86 [illegible]	Round 2 12/11/86 [illegible] Duplicate
Atomic Absorption Metal Results (ug/l)			
Arsenic, As	ND	ND	ND
Mercury, Hg	ND	ND	ND
Selenium, Se	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date (As,Hg):	11/20/86	[illegible]	[illegible]
Analysis date (Se):	12/01/86	[illegible]	[illegible]
Alkalinity Results (mg/l)			
Bicarbonate Alk., as CaCO3	49	[illegible]	[illegible]
Carbonate Alk., as CaCO3	ND	ND	ND
Hydroxide Alk., as CaCO3	ND	ND	ND
Analysis date:	11/21/86	[illegible]	[illegible]
429 Results (mg/l)			
Bromide	[illegible]	ND	ND
Chloride	[illegible]	11	[illegible]
Fluoride	0.3	ND	[illegible]
Nitrate, as N	ND	ND	ND
Nitrite, as N	ND	ND	ND
Phosphate, as P	ND	ND	ND
Sulfate	28	12	[illegible]
Detection limit factor:	1	1	1
Analysis date:	[illegible]	12/12/86	[illegible]
Total Cyanides (mg/l)	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date:	11/20/86	[illegible]	[illegible]
Total Dissolved Solids (mg/l)	130	[illegible]	[illegible]
Detection limit factor:	1	1	1
Analysis started:	11/17/86	[illegible]	[illegible]
Metal Results (ug/l)			
Barium, Ba	65	44	[illegible]
Cadmium, Cd	ND	ND	ND
Chromium, Cr	18	[illegible]	[illegible]
Lead, Pb	ND	ND	ND
Silver, Ag	ND	ND	ND
Detection limit factor:	1	1	1
Analysis date (Ba):	01/21/87	[illegible]	[illegible]
Analysis date (Others):	01/20/87	[illegible]	[illegible]
Mineral Results (mg/l)			
Calcium, Ca	[illegible]	[illegible]	[illegible]
Iron, Fe	[illegible]	[illegible]	[illegible]
Magnesium, Mg	[illegible]	[illegible]	[illegible]
Manganese, Mn	ND	ND	ND
Potassium, K	[illegible]	[illegible]	[illegible]
Sodium, Na	[illegible]	[illegible]	[illegible]
Detection limit factor:	[illegible]	[illegible]	[illegible]
Analysis date [illegible]:	[illegible]	[illegible]	[illegible]
Analysis date [illegible]:	[illegible]	[illegible]	[illegible]

TABLE N-28. Groundwater sampling results for Well MAFB-59 at Mather AFB, California - 7100 DISPOSAL AREA

	Round 1 11/16/86 786	Round 2 12/09/86 611
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	ND	ND
Trichlorofluoromethane	ND	ND
1,1 Dichloroethene	ND	ND
1,1 Dichloroethane	ND	ND
trans 1,2 Dichloroethene	ND	ND
Chloroform	ND	ND
1,2 Dichloroethane	ND	ND
1,1,1 Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2 Dichloropropane	ND	ND
trans 1,3 Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis 1,3 Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	72	95
Analysis Date:	11/20/86	12/11/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	2.0	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	[illegible]	[illegible]
Analysis Date:	11/20/86	12/11/86

	Round 1 11/16/86 786	Round 2 12/09/86 611
Atomic Absorption Metal Results (ug/l)		
Arsenic, As	ND	ND
Mercury, Hg	ND	ND
Selenium, Se	ND	ND
Detection limit factor:	1.00	1.00
Analysis date (As,Hg):	11/[illegible]/86	12/[illegible]/86
Analysis date (Se):	12/01/86	12/17/86
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	51	[illegible]
Carbonate Alk., as CaCO3	[illegible]	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/10/86
429 Results (mg/l)		
Bromide	0.1	0.1
Chloride	11	6.5
Fluoride	0.3	0.2
Nitrate, as N	0.3	ND
Nitrite, as N	0.2	ND
Phosphate, as P	ND	ND
Sulfate	19	6.9
Detection limit factor:	1	1
Analysis date:	11/17/86	12/10/86
Total Cyanides (mg/l)	ND	ND
Detection limit factor:	1	1
Analysis date:	11/26/86	12/16/86
Total Dissolved Solids (mg/l)	130	86
Detection limit factor:	1	1
Analysis started:	11/17/86	12/10/86
Metal Results (ug/l)		
Barium, Ba	64	38
Cadmium, Cd	ND	ND
Chromium, Cr	18	20
Lead, Pb	ND	ND
Silver, Ag	ND	ND
Detection limit factor	1	1
Analysis date (Ba):	01/21/87	01/21/87
Analysis date (Others):	01/20/87	01/20/87
Mineral Results (mg/l)		
Calcium, Ca	[illegible]	[illegible]
Iron, Fe	[illegible]	[illegible]
Magnesium, Mg	[illegible]	[illegible]
Manganese, Mn	ND	ND
Potassium, K	[illegible]	[illegible]
Sodium, Na	[illegible]	[illegible]
Detection limit factor	[illegible]	[illegible]
Analysis date (Ca)	[illegible]	[illegible]
Analysis date (Fe)	[illegible]	[illegible]

TABLE N-29. Groundwater sampling results for MAFB-60 at Mather AFB, California - WEST DITCH

	Round 1 11/14/86 774	Round 2 12/09/86 609
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	8.0 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	76	109
Analysis Date:	11/18/86	12/11/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	6.7	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	76	109
Analysis Date:	11/18/86	12/11/86

	Round 1 11/14/86 774	Round 2 12/09/86 609
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	86	94
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	ND	0.3
Chloride	24	10
Fluoride	0.3	0.2
Nitrate, as N	ND	ND
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	38	16
Detection limit factor:	1	1
Analysis date:	11/16/86	12/10/86
Total Dissolved Solids (mg/l)	150	110
Detection limit factor:	1	1
Analysis started:	11/15/86	12/10/86
Mineral Results (mg/l)		
Calcium, Ca	7.8	9.8
Iron, Fe	0.042	0.016
Magnesium, Mg	2	2.1
Manganese, Mn	0.011	0.003
Potassium, K	5	4.2
Sodium, Na	31	22
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-30. Groundwater sampling results for Well MAFB-61 at Mather AFB, California - WEST DITCH

	Round 1 11/13/86 769	Round 1 11/13/86 770 Duplicate	Round 2 12/09/86 605
601 Results (ug/l)			
Chloromethane	ND	ND	ND
Bromomethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
Chloroethane	ND	ND	ND
Methylene chloride	1.5a	1.3a	ND
Trichlorofluoromethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
Chloroform	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Bromodichloromethane	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Trichloroethene	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
Chloroethylvinyl ether	ND	ND	ND
Bromoform	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
Chlorobenzene	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	103	89	99
Analysis Date:	11/18/86	11/18/86	12/11/86
8020 Results (ug/l)			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
B	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Total Xylenes	ND	ND	ND
Detection limit factor:	1	1	1
Surrogate Recovery, %	103	89	99
Analysis Date:	11/18/86	11/18/86	12/11/86

	Round 1 11/13/86 769	Round 1 11/13/86 770 Duplicate	Round 2 12/09/86 605
Alkalinity Results (mg/l)			
Bicarbonate Alk., as $CaCO_3$	99	50	59
Carbonate Alk., as $CaCO_3$	ND	22	8
Hydroxide Alk., as $CaCO_3$	ND	ND	ND
Analysis date:	11/21/86	11/21/86	12/16/86
429 Results (mg/l)			
Bromide	ND	ND	ND
Chloride	2.5	2.4	2.5
Fluoride	0.1	0.1	ND
Nitrate, as N	1.1	1.1	1
Nitrite, as N	ND	ND	ND
Phosphate, as P	ND	ND	ND
Sulfate	6.1	6.1	3.8
Detection limit factor:	1	1	1
Analysis date:	11/14/86	11/14/86	12/10/86
Total Dissolved Solids (mg/l)	130	160	110
Detection limit factor:	1	1	1
Analysis started:	11/14/86	11/14/86	12/10/86
Mineral Results (mg/l)			
Calcium, Ca	14	14	7.5
Iron, Fe	0.28	0.035	0.066
Magnesium, Mg	0.46	0.45	0.33
Manganese, Mn	ND	ND	ND
Potassium, K	2.5	2.7	3
Sodium, Na	24	24	21
Detection limit factor:	1	1	1
Analysis date (ICP):	01/20/87	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87	01/19/87

TABLE N-31. Groundwater sampling results for Well MAFB-62 at Mather AFB, California - WEST DITCH

	Round 1 11/14/86 777	Round 2 12/09/86 606
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	6.8 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-DCE	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	81	93
Analysis Date:	11/19/86	12/11/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	81	93
Analysis Date:	11/19/86	12/11/86

	Round 1 11/14/86 777	Round 2 12/09/86 606
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	50	65
Carbonate Alk., as CaCO3	42	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	ND	0.3
Chloride	7.8	3.6
Fluoride	0.3	ND
Nitrate, as N	0.1	0.8
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	38	29
Detection limit factor:	1	1
Analysis date:	11/16/86	12/10/86
Total Dissolved Solids (mg/l)	ND	140
Detection limit factor:	1	1
Analysis started:	11/15/86	12/10/86
Mineral Results (mg/l)		
Calcium, Ca	12	12
Iron, Fe	0.08	0.032
Magnesium, Mg	1.6	1.1
Manganese, Mn	ND	ND
Potassium, K	4.3	3.7
Sodium, Na	41	26
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-32. Groundwater sampling results for Well MAFB-63 at Mather AFB, California - WEST DITCH

	Round 1 11/13/86 766	Round 2 12/08/86 602
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.1 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	1.6	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3 Dichloropropene	ND	ND
Trichloroethene	6.3	1.8
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2 Tetrachloroethane 2	ND	ND
Tetrachloroethene 2	12	11
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	87	119
Analysis Date:	11/17/86	12/11/86
8020 Results (ug/l)		
Benzene	ND	0.9
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	87	119
Analysis Date:	11/17/86	12/11/86

	Round 1 11/13/86 766	Round 2 12/08/86 602
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	51	42
Carbonate Alk., as CaCO3	22	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/09/86
429 Results (mg/l)		
Bromide	ND	ND
Chloride	5	5.2
Fluoride	ND	ND
Nitrate, as N	2.4	1.9
Nitrite, as N	ND	0.8
Phosphate, as P	ND	ND
Sulfate	5.1	7.5
Detection limit factor:	1	1
Analysis date:	11/14/86	12/09/86
Total Dissolved Solids (mg/l)	120	98
Detection limit factor:	1	1
Analysis started:	11/14/86	12/09/86
Mineral Results (mg/l)		
Calcium, Ca	16	9.7
Iron, Fe	0.031	0.018
Magnesium, Mg	2.5	0.27
Manganese, Mn	ND	ND
Potassium, K	2.2	3.4
Sodium, Na	12	16
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/20/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-33. Groundwater sampling results for Well MAFB-64 at Mather AFB, California - N.E. PERIMETER

	Round 1 11/14/86 775	Round 2 12/10/86 618
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	7.2 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	89	112
Analysis Date:	11/19/86	12/12/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	89	112
Analysis Date:	11/19/86	12/12/86

	Round 1 11/14/86 775	Round 2 12/10/86 618
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	39	38
Carbonate Alk., as CaCO3	18	12
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	0.1	0.3
Chloride	6.4	3.2
Fluoride	0.5	0.2
Nitrate, as N	ND *	ND
Nitrite, as N	ND *	ND
Phosphate, as P	ND	ND
Sulfate	29	6.6
Detection limit factor:	1	1
Analysis date:	11/17/86	12/11/86
Total Dissolved Solids (ug/l)	140 *	48
Detection limit factor:	1	1
Analysis started:	11/17/86	12/11/86
Mineral Results (mg/l)		
Calcium, Ca	2.1	3.3
Iron, Fe	0.13	0.12
Magnesium, Mg	0.15	0.42
Manganese, Mn	ND	ND
Potassium, K	3.7	3.4
Sodium, Na	33	18
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

* Data invalid, holding time exceeded

TABLE N-34. Groundwater sampling results for Well MAFB-65 at Mather AFB, California - N.E. PERIMETER

	Round 1 11/15/86 779	Round 2 12/10/86 615
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	5.2 a	1.7 a
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	74	114
Analysis Date:	11/19/86	12/12/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	74	114
Analysis Date:	11/19/86	12/12/86

	Round 1 11/15/86 779	Round 2 12/10/86 615
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	60	50
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	0.1	0.2
Chloride	7.3	2.8
Fluoride	0.2	0.2
Nitrate, as N	0.5	1.4
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	15	2.4
Detection limit factor:	1	1
Analysis date:	11/17/86	12/11/86
Total Dissolved Solids (mg/l)	96	100
Detection limit factor:	1	1
Analysis started:	11/17/86	12/12/86
Mineral Results (mg/l)		
Calcium, Ca	8.7	7.7
Iron, Fe	0.017	0.024
Magnesium, Mg	3.4	3.6
Manganese, Mn	ND	0.026
Potassium, K	1.8	2
Sodium, Na	17	8.9
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-35. Groundwater sampling results for Well MAFB-66 at Mather AFB, California - N.E. PERIMETER

	Round 1 11/15/86 781	Round 2 12/10/86 620
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	8.0 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2-Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	93	101
Analysis Date:	11/19/86	12/12/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2 Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	93	101
Analysis Date:	11/19/86	12/12/86

	Round 1 11/15/86 781	Round 2 12/10/86 620
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	64	36
Carbonate Alk., as CaCO3	6	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	ND	0.3
Chloride	8.9	3.3
Fluoride	0.4	ND
Nitrate, as N	0.2	0.4
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	49	6.4
Detection limit factor:	1	1
Analysis date:	11/17/86	12/11/86
Total Dissolved Solids (mg/l)	140	62
Detection limit factor:	1	1
Analysis started:	11/17/86	12/11/86
Mineral Results (mg/l)		
Calcium, Ca	4.7	3.7
Iron, Fe	0.022	0.051
Magnesium, Mg	0.24	0.32
Manganese, Mn	ND	ND
Potassium, K	3.4	3.7
Sodium, Na	35	15
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

TABLE N-36. Groundwater sampling results for Well MAFB-67 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/12/86 759	Round 2 12/13/86 657
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.4 a	0.6 a
Trichlorofluoromethane	ND	ND
1,1-Dichlorethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2 Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2-Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	80	105
Analysis Date:	11/14/86	12/22/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	80	104
Analysis Date:	11/14/86	12/22/86

	Round 1 11/12/86 759	Round 2 12/13/86 657
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	81	55
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.1	0.6
Chloride	18	4.3
Fluoride	0.6	0.3
Nitrate, as N	0.2	ND *
Nitrite, as N	ND	ND *
Phosphate, as P	ND	ND
Sulfate	28	7.6
Detection limit factor:	1	1
Analysis date:	11/13/86	12/16/86
Total Dissolved Solids (mg/l)	140	120
Detection limit factor:	1	1
Analysis started:	11/13/86	12/15/86
Mineral Results (mg/l)		
Calcium, Ca	4.9	7.1
Iron, Fe	0.024	0.062
Magnesium, Mg	1.6	2.8
Manganese, Mn	ND	0.003
Potassium, K	2.3	3.4
Sodium, Na	46	16
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

* Data for nitrate/nitrite invalid, holding time exceeded

TABLE N-37. Groundwater sampling results for Well MAFB-68 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/12/86 760	Round 2 12/13/86 655
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.4 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2-Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	74	96
Analysis Date:	11/14/86	12/23/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	7.5
Total Xylenes	5.0	5.5
Detection limit factor:	1	1
Surrogate Recovery, %	74	93
Analysis Date:	11/14/86	12/23/86

	Round 1 11/12/86 760	Round 2 12/13/86 655
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	49	49
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	ND	0.4
Chloride	5.6	2.4
Fluoride	0.3	0.2
Nitrate, as N	0.4	ND *
Nitrite, as N	ND	ND *
Phosphate, as P	ND	ND
Sulfate	9.1	4.5
Detection limit factor:	1	1
Analysis date:	11/13/86	12/16/86
Total Dissolved Solids (mg/l)	81	58
Detection limit factor:	1	1
Analysis started:	11/13/86	12/15/86
Mineral Results (mg/l)		
Calcium, Ca	8.7	8
Iron, Fe	0.036	0.47
Magnesium, Mg	3.1	3.1
Manganese, Mn	ND	ND
Potassium, K	2	2.3
Sodium, Na	4	8.7
Detection limit factor:	1	1
Analysis date (ICP):	01/20/87	01/21/87
Analysis date (K):	01/19/87	01/19/87

* Data for nitrate/nitrite invalid, holding time exceeded

TABLE N-38. Groundwater sampling results for Well MAFB-69 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/13/86 765	Round 2 12/13/86 654
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.1 a	1.0 a
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2-Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	106	57
Analysis Date:	11/17/86	12/19/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	106	63
Analysis Date:	11/17/86	12/19/86

	Round 1 11/13/86 765	Round 2 12/13/86 654
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	60	51
Carbonate Alk., as CaCO3	4	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	ND	0.4
Chloride	2.4	2.4
Fluoride	0.2	0.2
Nitrate, as N	0.4	0.4 *
Nitrite, as N	ND	ND *
Phosphate, as P	ND	ND
Sulfate	6.8	6.8
Detection limit factor:	1	1
Analysis date:	11/14/86	12/16/86
Total Dissolved Solids (mg/l)	120	110
Detection Limit Factor:	1	1
Analysis started:	11/14/86	12/15/86
Mineral Results (mg/l)		
Calcium, Ca	11	10
Iron, Fe	0.31	0.079
Magnesium, Mg	2.2	2.9
Manganese, Mn	ND	ND
Potassium, K	1.4	1.9
Sodium, Na	12	11
Detection limit factor:	1	1
Analysis date(ICP):	1/20/87	1/21/87
Analysis date(K):	1/19/87	1/19/87

* Data for nitrate/nitrite invalid, holding time exceeded

TABLE N-39. Groundwater sampling results for Well MAFB-70 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/1[illegible]/86 753	Round 2 12/12/86 643
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.1 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2-Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	62	49
Analysis Date:	11/14/86	12/18/86
8020 Results (ug/l)		
Benzene	ND	22
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	1.6
Ethylbenzene	ND	1.6
Toluene	ND	6.8
Total Xylenes	ND	8.2
Detection limit factor:	1	1
Surrogate Recovery, %	62	53
Analysis Date:	11/14/86	12/18/86

	Round 1 11/18/86 753	Round 2 12/12/86 643
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	68	68
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.2	1.2
Chloride	3	3
Fluoride	0.2	0.2
Nitrate, as N	2.2	ND
Nitrite, as N	ND	ND
Phosphate, as P	[illegible]	[illegible]
Sulfate	1.7	2.3
Detection limit factor:	1	1
Analysis date:	11/12/86	12/14/86
Total Dissolved Solids(mg/l)	170	100
Detection limit factor:	1	1
Analysis started:	11/12/86	12/14/86
Mineral Results (mg/l)		
Calcium, Ca	7.2	7.3
Iron, Fe	0.3	0.19
Magnesium, Mg	3.1	2.6
Manganese, Mn	ND	ND
Potassium, K	4.4	5.4
Sodium, Na	17	20
Detection limit factor:	1	1
Analysis date (ICP):	1/20/87	1/21/87
Analysis date (K):	1/19/87	1/19/87

TABLE N-40. Groundwater sampling results for Well MAFB-71 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/11/86 755	Round 2 12/12/86 646
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	ND	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
2-Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	96	102
Analysis Date:	11/17/86	12/19/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	5.0	1.0
Toluene	42	ND
Total Xylenes	23	9.0
Detection limit factor:	1	1
Surrogate Recovery, %	96	106
Analysis Date:	11/17/86	12/19/86

	Round 1 11/11/86 755	Round 2 12/12/86 646
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	34	47
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.1	0.4
Chloride	7.4	2.9
Fluoride	0.7	0.3
Nitrate, as N	0.2	ND
Nitrite, as N	ND	ND
Phosphate, as P	ND	0.5
Sulfate	16	5
Detection limit factor:	1	1
Analysis date:	11/12/86	12/14/86
Total Dissolved Solids (mg/l)	100	54
Detection limit factor:	1	1
Analysis started:	11/12/86	12/14/86
Mineral Results (mg/l)		
Calcium, Ca	5.7	7.1
Iron, Fe	0.043	0.055
Magnesium, Mg	1.1	2.7
Manganese, Mn	ND	ND
Potassium, K	3.7	2.1
Sodium, Na	17	11
Detection limit factor:	1	1
Analysis date (ICP):	1/20/87	1/21/87
Analysis date (K):	1/19/87	1/19/87

TABLE N-41. Groundwater sampling results for Well MAFB-72 at Mather AFB, California ACW DISPOSAL SITE

	Round 1 11/11/86 757	Round 2 12/13/86 650
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	1.6 a	1.0 a
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	76	106
Analysis Date:	11/14/86	12/19/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	76	101
Analysis Date:	11/14/86	12/19/86

	Round 1 11/11/86 757	Round 2 12/13/86 650
Alkalinity Results (mg/l)		
Bicarbonate Alk., as $CaCO_3$	79	60
Carbonate Alk., as $CaCO_3$	ND	16
Hydroxide Alk., as $CaCO_3$	ND	ND
Analysis date:	11/21/86	12/17/86
429 Results (mg/l)		
Bromide	0.1	0.6
Chloride	13	3.9
Fluoride	0.8	0.3
Nitrate, as N	0.2	ND *
Nitrite, as N	ND	ND *
Phosphate, as P	ND	ND
Sulfate	26	3
Detection limit factor:	1	1
Analysis date:	11/12/86	12/16/86
Total Dissolved Solids (mg/l)	200	120
Detection limit factor:	1	1
Analysis started:	11/12/86	12/15/86
Mineral Results (mg/l)		
Calcium, Ca	4.6	3.4
Iron, Fe	0.15	0.098
Magnesium, Mg	1.2	0.72
Manganese, Mn	ND	ND
Potassium, K	2.3	4.2
Sodium, Na	44	27
Detection limit factor:	1	1
Analysis date (ICP):	1/20/87	1/21/87
Analysis date (K):	1/19/87	1/19/87

* Data for nitrate/nitrite invalid, holding time exceeded

TABLE N-42. Groundwater sampling results for Well MAFB-73 at Mather AFB, California - ACW DISPOSAL SITE

	Round 1 11/15/86 780	Round 2 12/10/86 619
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	7.4 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichlorethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	92	107
Analysis Date:	11/19/86	12/12/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4 Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	92	107
Analysis Date:	11/19/86	12/12/86

	Round 1 11/15/86 780	Round 2 12/10/86 619
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3	100	60
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	ND	ND
Chloride	3.7	3.2
Fluoride	0.2	0.2
Nitrate, as N	0.6	2.3
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	12	12
Detection limit factor:	1	1
Analysis date:	11/17/86	12/11/86
Total Dissolved Solids (mg/l)	84	1600
Detection limit factor:	1	1
Analysis started:	11/17/86	12/12/86
Mineral Results (mg/l)		
Calcium, Ca	9.1	8
Iron, Fe	0.045	0.26
Magnesium, Mg	4.3	4.4
Manganese, Mn	0.006	0.11
Potassium, K	1.4	0.76
Sodium, Na	12	18
Detection limit factor:	1	1
Analysis date (ICP):	1/20/87	1/21/87
Analysis date (K):	1/19/87	1/19/87

TABLE N-43. Groundwater sampling results for Well MAFB-75 at Mather AFB, California - N.E. PERIMETER

	Round 1 11/15/86 778	Round 2 12/10/86 617
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	7.5 a	0.6 a
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
1,1,2,2-Tetrachloroethane 2	ND	ND
Tetrachloroethene 2	ND	0.6
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	101	93
Analysis Date:	11/19/86	12/12/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3 Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	101	105
Analysis Date:	11/19/86	12/17/86

	Round 1 11/15/86 778	Round 2 12/10/86 617
Alkalinity Results (ug/l)		
Bicarbonate Alk., as CaCO3	62	57
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	0.1	ND
Chloride	4.9	4.6
Fluoride	0.1	ND
Nitrate, as N	2.6	2.8
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	6.8	5.8
Detection limit factor:	1	1
Analysis date:	11/17/86	12/11/86
Total Dissolved Solids (mg/l)	120	130
Detection limit factor:	1	1
Analysis started:	11/17/86	12/11/86
Mineral Results (mg/l)		
Calcium, Ca	11	12
Iron, Fe	0.032	0.078
Magnesium, Mg	6.1	6.4
Manganese, Mn	0.05	0.024
Potassium, K	1.4	1.4
Sodium, Na	9.3	8.6
Detection limit factor:	1	1
Analysis date (ICP):	1/20/87	1/21/87
Analysis date (K):	1/19/87	1/19/87

TABLE **N-44.** Groundwater sampling results for Well MAFB-76 at Mather AFB, California - N.E. PERIMETER

	Round 1 11/14/86 776	Round 2 12/10/86 616
601 Results (ug/l)		
Chloromethane	ND	ND
Bromomethane	ND	ND
Dichlorodifluoromethane	ND	ND
Vinyl chloride	ND	ND
Chloroethane	ND	ND
Methylene chloride	6.6 a	ND
Trichlorofluoromethane	ND	ND
1,1-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
trans-1,2-Dichloroethene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-Trichloroethane	3.3 q	ND
Carbon tetrachloride	ND	ND
Bromodichloromethane	ND	ND
1,2-Dichloropropane	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Dibromochloromethane	ND	ND
1,1,2-Trichloroethane	ND	ND
cis-1,3-Dichloropropene	ND	ND
Chloroethylvinyl ether	ND	ND
Bromoform	ND	ND
Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
Chlorobenzene	ND	ND
Dichlorobenzenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	79	96
Analysis Date:	11/19/86	12/12/86
8020 Results (ug/l)		
Benzene	ND	ND
Chlorobenzene	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Detection limit factor:	1	1
Surrogate Recovery, %	79	96
Analysis Date:	11/19/86	12/12/86

	Round 1 11/14/86 776	Round 2 12/10/86 616
Alkalinity Results (ug/l)		
Bicarbonate Alk., as CaCO3	49	48
Carbonate Alk., as CaCO3	ND	ND
Hydroxide Alk., as CaCO3	ND	ND
Analysis date:	11/21/86	12/16/86
429 Results (mg/l)		
Bromide	0.2	0.2
Chloride	11	11
Fluoride	0.1	ND
Nitrate, as N	3.5	3.5
Nitrite, as N	ND	ND
Phosphate, as P	ND	ND
Sulfate	3.3	3.2
Detection limit factor:	1	1
Analysis date:	11/16/86	12/11/86
Total Dissolved Solids (mg/l)	180	130
Detection limit factor:	1	1
Analysis started:	11/15/86	12/11/86
Mineral Results (mg/l)		
Calcium, Ca	13	12
Iron, Fe	0.067	0.042
Magnesium, Mg	6.5	6.4
Manganese, Mn	0.05	0.012
Potassium, K	0.96	0.76
Sodium, Na	9	8.7
Detection limit factor:	1	1
Analysis date (ICP):	1/20/87	1/21/87
Analysis date (K):	1/19/87	1/19/87

TABLE N-45. Groundwater sampling results for Well AC-01 at Mather AFB, California Base Production

	Round 1	Round 2 12/12/86 647
	NOT TAKEN	
601 Results (ug/l)		
Chloromethane		ND
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		ND
Trichlorofluoromethane		ND
1,1-Dichloroethene		ND
1,1-Dichloroethane		ND
trans-1,2-Dichloroethene		ND
Chloroform		ND
1,2-Dichloroethane		ND
1,1,1-Trichloroethane		ND
Carbon tetrachloride		ND
Bromodichloromethane		ND
1,2-Dichloropropane		ND
trans-1,3-Dichloropropene		ND
Trichloroethene		1.8
Dibromochloromethane		ND
1,1,2-Trichloroethane		ND
cis-1,3-Dichloropropene		ND
2-Chloroethylvinyl ether		ND
Bromoform		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		102
Analysis Date:		12/19/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		103
Analysis Date:		12/19/86

Only one sample authorized for production wells

	Round 1	Round 2 12/12/86 647
	NOT TAKEN	
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		49
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Analysis date:		12/17/86
429 Results (mg/l)		
Bromide		ND
Chloride		2.4
Fluoride		0.2
Nitrate, as N		1.3
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		4.5
Detection limit factor:		1
Analysis date:		12/14/86
Total Dissolved Solids (mg/l)		110
Detection limit factor:		1
Analysis started:		12/14/86
Mineral Results (mg/l)		
Calcium, Ca		9.1
Iron, Fe		0.14
Magnesium, Mg		4.1
Manganese, Mn		ND
Potassium, K		1
Sodium, Na		7.6
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Analysis date (K):		1/19/87

TABLE N-46. Groundwater sampling results for Base Well HW-01 at Mather AFB, California Base Production

Only one sample authorized for production wells

	Round 1	Round 2 12/10/86
	NOT TAKEN	628
601 Results (ug/l)		
Chloromethane		ND
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		ND
Trichlorofluoromethane		ND
1,1-Dichloroethene		ND
1,1-Dichloroethane		ND
trans-1,2-Dichloroethene		ND
Chloroform		ND
1,2-Dichloroethane		2.8
1,1,1-Trichloroethane		ND
Carbon tetrachloride		ND
Bromodichloromethane		ND
1,2-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Trichloroethene		ND
Dibromochloromethane		ND
1,1,2-Trichloroethane		ND
cis-1,3-Dichloropropene		ND
Chloroethylvinyl ether		ND
Bromoform		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		147
Analysis Date:		12/15/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		147
Analysis Date:		12/15/86

	Round 1	Round 2 12/10/86
	NOT TAKEN	628
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		110
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Analysis date:		12/17/86
429 Results (mg/l)		
Bromide		ND
Chloride		4.1
Fluoride		ND
Nitrate, as N		ND
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		ND
Detection limit factor:		1
Analysis date:		12/11/86
Total Dissolved Solids (mg/l)		180
Detection Limit factor:		1
Analysis started:		12/11/86
Mineral Results (mg/l)		
Calcium, Ca		18
Iron, Fe		0.3
Magnesium, Mg		9.4
Manganese, Mn		0.25
Potassium, K		3.4
Sodium, Na		11
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Analysis date (K):		1/19/87

TABLE N-47. Groundwater sampling results for Well HW-03 at Mather AFB, California Base Production

	Round 1	Round 2
		12/10/86
	NOT TAKEN	624
601 Results (ug/l)		
Chloromethane		ND
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		ND
Trichlorofluoromethane		ND
1,1-Dichloroethene		ND
1,1-Dichloroethane		ND
trans-1,2-Dichloroethene		ND
Chloroform		ND
1,2-Dichloroethane		ND
1,1,1-Trichloroethane		ND
Carbon tetrachloride		ND
Bromodichloromethane		ND
1,2-Dichloropropane		ND
trans-1,3-Dichloropropene		ND
Trichloroethene		ND
Dibromochloromethane		ND
1,1,2-Trichloroethane		ND
cis-1,3-Dichloropropane		ND
Chloroethylvinyl ether		ND
Bromoform		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		83
Analysis Date:		12/12/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		83
Analysis Date:		12/12/86

Only one sample authorized for production wells

	Round 1	Round 2
		12/10/86
	NOT TAKEN	624
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		110
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Analysis date:		12/17/86
429 Results (mg/l)		
Bromide		ND
Chloride		6.7
Fluoride		ND
Nitrate, as N		ND
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		ND
Detection limit factor:		1
Analysis date:		12/11/86
Total Dissolved Solids (mg/l)		180
Detection limit factor:		1
Analysis started:		12/11/86
Mineral Results (mg/l)		
Calcium, Ca		20
Iron, Fe		0.35
Magnesium, Mg		9.8
Manganese, Mn		0.16
Potassium, K		3.8
Sodium, Na		11
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Analysis date (K):		1/19/87

TABLE N-48. Groundwater sampling results for Well HW-04 at Mather AFB, California Base Production

	Round 1	Round 2 12/10/86
	NOT TAKEN	621
601 Results (ug/l)		
Chloromethane		ND
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		ND
Trichlorofluoromethane		ND
1,1-Dichloroethene		ND
1,1-Dichloroethane		ND
trans-1,2-Dichloroethene		ND
Chloroform		ND
1,2-Dichloroethane		ND
1,1,1-Trichloroethane		ND
Carbon tetrachloride		ND
Bromodichloromethane		ND
1,2-Dichloropropane		ND
trans-1,3-Dichloropropene		ND
Trichloroethene		ND
Dibromochloromethane		ND
1,1,2-Trichloroethane		ND
cis-1,3-Dichloropropene		ND
Chloroethylvinyl ether		ND
Bromoform		ND
Tetrachloroethane		ND
Tetrachloroethene		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		130
Analysis Date:		12/12/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		130
Analysis Date:		12/12/86

Only one sample authorized for production wells

	Round 1	Round 2 12/10/86
	NOT TAKEN	621
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		38
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Analysis date:		12/17/86
429 Results (mg/l)		
Bromide		ND
Chloride		8.1
Fluoride		ND
Nitrate, as N		ND
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		ND
Detection limit factor:		1
Analysis date:		12/11/86
Total Dissolved Solids (mg/l)		150
Detection limit factor:		1
Analysis started:		12/11/86
Mineral Results (mg/l)		
Calcium, Ca		13
Iron, Fe		0.095
Magnesium, Mg		6.1
Manganese, Mn		0.13
Potassium, K		2.9
Sodium, Na		9.2
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Analysis date (K):		1/19/87

TABLE N-49. Groundwater sampling results for Well HW-05 at Mather AFB, California Base Production

	Round 1 NOT TAKEN	Round 2 12/10/86 626
601 Results (ug/l)		
Chloromethane		ND
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		ND
Trichlorofluoromethane		ND
1,1-Dichloroethene		ND
1,1-Dichloroethane		ND
trans-1,2-Dichloroethene		ND
Chloroform		ND
1,2-Dichloroethane		ND
1,1,1-Trichloroethane		ND
Carbon tetrachloride		ND
Bromodichloromethane		ND
1,2-Dichloropropane		ND
trans-1,3-Dichloropropene		ND
Trichloroethene		ND
Dibromochloromethane		ND
1,1,2-Trichloroethane		ND
cis-1,3-Dichloropropene		ND
Chloroethylvinyl ether		ND
Bromoform		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		85
Analysis Date:		12/13/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		85
Analysis Date:		12/13/86

Only one sample authorized for production wells

	Round 1 NOT TAKEN	Round 2 12/10/86 626
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		78
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Analysis date:		12/17/86
429 Results (mg/l)		
Bromide		ND
Chloride		7.5
Fluoride		ND
Nitrate, as N		ND
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		ND
Detection limit factor:		1
Analysis date:		12/11/86
Total Dissolved Solids (mg/l)		150
Detection limit factor:		1
Analysis started:		12/11/86
Mineral Results (mg/l)		
Calcium, Ca		12
Iron, Fe		0.052
Magnesium, Mg		4.9
Manganese, Mn		0.081
Potassium, K		3
Sodium, Na		13
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Analysis date (K):		1/19/87

TABLE N-50. Groundwater sampling results for Well HW-06 at Mather AFB, California Base Production

	Round 1	Round 2
		12/10/86
	NOT TAKEN	627
601 Results (ug/l)		
Chloromethane		ND
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		ND
Trichlorofluoromethane		ND
1,1-DCE		ND
1,1-DCA		ND
trans-1,2-DCE		ND
Chloroform		ND
1,2-DCA		ND
1,1,1-TCA		ND
Carbon tetrachloride		ND
Bromodichloromethane		ND
1,2-Dichloropropane		ND
trans-1,3-Dichloropropane		ND
TCE		ND
Dibromochloromethane a		ND
1,1,2-Trichloroethane a		ND
cis-1,3-Dichloropropane a		ND
Chloroethylvinyl ether		ND
Bromoform		ND
Tetrachloroethane b		ND
Tetrachloroethene b		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		91
Analysis Date:		12/13/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		91
Analysis Date:		12/13/86

Only one sample authorized for production wells

	Round 1	Round 2
		12/10/86
	NOT TAKEN	627
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		68
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Detection limit factor:		
Analysis date:		12/17/86
429 Results (mg/l)		
Bromide		ND
Chloride		4.3
Fluoride		ND
Nitrate, as N		0.6
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		0.6
Detection limit factor:		1
Analysis date:		12/11/86
Total Dissolved Solids (mg/l)		130
Detection limit factor:		1
Analysis date:		12/11/86
Mineral Results (mg/l)		
Calcium, Ca		12
Iron, Fe		0.086
Magnesium, Mg		5.8
Manganese, Mn		0.12
Potassium, K		2.3
Sodium, Na		10
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Analysis date (K):		1/19/87

TABLE N-51. Groundwater sampling results for Well JT-01 at Mather AFB, California Base Production

Only one sample authorized for production wells

	Round 1 NOT TAKEN	Round 2 12/12/86 648
601 Results (ug/l)		
Chloromethane		
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		1.4 a
Trichlorofluoromethane		ND
1,1-Dichloroethene		ND
1,1-Dichloroethane		ND
trans-1,2-Dichloroethene		ND
Chloroform		ND
1,2-Dichloroethane		ND
1,1,1-Trichloroethane		ND
Carbon tetrachloride		ND
Bromodichloromethane		0.7
1,2-Dichloropropane		ND
trans-1,3-Dichloropropene		ND
Trichloroethene		ND
Dibromochloromethane		1.7
1,1,2-Trichloroethane		ND
cis-1,3-Dichloropropene		ND
Chloroethylvinyl ether		ND
Bromoform		2.0
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		121
Analysis Date:		12/23/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		102
Analysis Date:		12/23/86

	Round 1 NOT TAKEN	Round 2 12/12/86 648
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		140
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Detection limit factor:		
Analysis date:		12/17/86
429 Results (mg/l)		
Bromide		ND
Chloride		16
Fluoride		ND
Nitrate, as N		5.4
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		10
Detection limit factor:		1
Analysis date:		12/14/86
Total Dissolved Solids (mg/l)		250
Detection limit factor:		1
Analysis started:		12/14/86
Mineral Results (mg/l)		
Calcium, Ca		34
Iron, Fe		0.35
Magnesium, Mg		16
Manganese, Mn		ND
Potassium, K		1.6
Sodium, Na		15
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Anlysis date (K):		1/19/87

TABLE N-52. Groundwater sampling results for Well K-9 at Mather AFB, California Base Production

	Round 1	Round 2 12/10/86 623
	NOT TAKEN	
601 Results (ug/l)		
Chloromethane		ND
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		ND
Trichlorofluoromethane		ND
1,1-Dichloroethene		ND
1,1-Dichloroethane		ND
trans-1,2-Dichloroethene		ND
Chloroform		0.7
1,2-Dichloroethane		ND
1,1,1-Trichloroethane		ND
Carbon tetrachloride		ND
Bromodichloromethane		ND
1,2-Dichloropropane		ND
trans-1,3-Dichloropropene		ND
Trichloroethene		ND
Dibromochloromethane		ND
1,1,2-Trichloroethane		ND
cis-1,3-Dichloropropene		ND
Chloroethylvinyl ether		ND
Bromoform		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		108
Analysis Date:		12/12/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		108
Analysis Date:		12/12/86

Only one sample authorized for production wells

	Round 1	Round 2 12/10/86 623
	NOT TAKEN	
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		76
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Analysis date:		12/17/86
429 Results (mg/l)		
Bromide		ND
Chloride		5.5
Fluoride		ND
Nitrate, as N		ND
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		0.4
Detection limit factor:		1
Analysis date:		12/11/86
Total Dissolved Solids (mg/l)		140
Detection limit factor:		1
Analysis started:		12/11/86
Mineral Results (mg/l)		
Calcium, Ca		11
Iron, Fe		0.11
Magnesium, Mg		5.1
Manganese, Mn		0.11
Potassium, K		1.7
Sodium, Na		15
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Analysis date (K):		1/19/87

TABLE N-53. Groundwater sampling results for well MB-01 at Mather AFB, California Base Production

	Round 1	Round 2 12/10/86
	NOT TAKEN	622
601 Results (ug/l)		
Chloromethane		ND
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		ND
Trichlorofluoromethane		ND
1,1-Dichloroethene		ND
1,1-Dichloroethane		ND
trans-1,2-Dichloroethene		ND
Chloroform		ND
1,2-Dichloroethane		ND
1,1,1-Trichloroethane		ND
Carbon tetrachloride		ND
Bromodichloromethane		ND
1,2-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Trichloroethene		ND
Dibromochloromethane		ND
1,1,2-Trichloroethane		ND
cis-1,3-Dichloropropane		ND
Chloroethylvinyl ether		ND
Bromoform		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		89
Analysis Date:		12/12/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2 Dichlorobenzene		ND
1,3 Dichlorobenzene		ND
1,4 Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		89
Analysis Date:		12/12/86

Only one sample authorized for production wells

	Round 1	Round 2 12/10/86
	NOT TAKEN	622
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		41
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Analysis date:		12/17/86
429 Results (ug/l)		
Bromide		ND
Chloride		2.3
Fluoride		ND
Nitrate, as N		1.7
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		1.9
Detection limit factor:		1
Analysis date:		12/11/86
Total Dissolved Solids (mg/l)		81
Detection limit factor:		1
Analysis date:		12/11/86
Mineral Results (mg/l)		
Calcium, Ca		7.5
Iron, Fe		0.02
Magnesium, Mg		4
Manganese, Mn		ND
Potassium, K		0.97
Sodium, Na		7.4
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Analysis date (K):		1/19/87

TABLE N-54. Groundwater sampling results for Well MB-04 at Mather AFB, California Base Production

Only one sample authorized for production wells

	Round 1	Round 2 12/10/86 625
	NOT TAKEN	
601 Results (ug/l)		
Chloromethane		ND
Bromomethane		ND
Dichlorodifluoromethane		ND
Vinyl chloride		ND
Chloroethane		ND
Methylene chloride		ND
Trichlorofluoromethane		ND
1,1-Dichlorethene		ND
1,1-Dichloroethane		ND
trans-1,2-Dichloroethene		ND
Chloroform		ND
1,2-Dichloroethane		ND
1,1,1-Trichloroethane		ND
Carbon tetrachloride		ND
Bromodichloromethane		ND
1,2-Dichloropropane		ND
trans-1,3-Dichloropropene		ND
Trichloroethene		ND
Dibromochloromethane 1		ND
1,1,2-Trichloroethene 1		ND
cis-1,3-Dichloropropene 1		ND
Chloroethylvinyl ether		ND
Bromoform		ND
1,1,2,2-Tetrachloroethane 2		ND
Tetrachloroethene 2		ND
Chlorobenzene		ND
Dichlorobenzenes		ND
Detection limit factor:		1
Surrogate Recovery, %		78
Analysis Date:		12/13/86
8020 Results (ug/l)		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4 Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Total Xylenes		ND
Detection limit factor:		1
Surrogate Recovery, %		78
Analysis Date:		12/13/86

	Round 1	Round 2 12/10/86 625
	NOT TAKEN	
Alkalinity Results (mg/l)		
Bicarbonate Alk., as CaCO3		42
Carbonate Alk., as CaCO3		ND
Hydroxide Alk., as CaCO3		ND
Analysis date:		12/17/86
429 Results (mg/l)		
Bromide		ND
Chloride		2.5
Fluoride		ND
Nitrate, as N		1.3
Nitrite, as N		ND
Phosphate, as P		ND
Sulfate		1.5
Detection limit factor:		1
Analysis date:		12/11/86
Total Dissolved Solids (mg/l)		120
Detection limit factor:		1
Analysis started:		12/11/86
Mineral Results (mg/l)		
Calcium, Ca		8.6
Iron, Fe		0.018
Magnesium, Mg		3.9
Manganese, Mn		ND
Potassium, K		1.9
Sodium, Na		6.8
Detection limit factor:		1
Analysis date (ICP):		1/21/87
Analysis date (K):		1/19/87

TABLE N-55. Method Detection Limits for Analytical Parameters

	MDL
601 (ug/l)	
Chloromethane	0.5
Bromomethane	0.5
Dichlorodifluoromethane	0.5
Vinyl chloride	0.5
Chloroethane	0.5
Methylene chloride	0.5
Trichlorofluoromethane	0.5
1,1 Dichloroethene	0.5
1,1 Dichloroethane	0.5
trans 1,2 Dichloroethene	0.5
Chloroform	0.5
1,2 Dichloroethane	0.5
1,1,1-Trichloroethane	0.5
Carbon tetrachloride	0.5
Bromodichloromethane	0.5
1,2-Dichloropropane	0.5
trans-1,3-Dichloropropene	0.5
Trichloroethene	0.5
Dibromochloromethane	0.5
1,1,2-Trichloroethane	0.5
cis-1,3-Dichloropropene	0.5
Chloroethylvinyl ether	0.5
Bromoform	0.5
1,1,2,2-Tetrachloroethane	0.5
Tetrachloroethene	0.5
Chlorobenzene	0.5
Dichlorobenzenes	0.5
8020 Results (ug/l)	
Benzene	0.5
Chlorobenzene	0.5
1,2 Dichlorobenzene	0.5
1,3 Dichlorobenzene	0.5
1,4 Dichlorobenzene	0.5
Ethylbenzene	0.5
Toluene	1.0
Total Xylenes	2.0

	MDL
Atomic Absorption Metal Results (ug/l)	
Arsenic, As	2
Mercury, Hg	0.2
Selenium, Se	2
Alkalinity Results (ug/l)	
Bicarbonate Alk., as CaCO3	2
Carbonate Alk., as CaCO3	4
Hydroxide Alk., as CaCO3	2
429 Results (mg/l)	
Bromide	0.1
Chloride	0.1
Fluoride	0.1
Nitrate, as N	0.1
Nitrite, as N	0.1
Phosphate, as P	0.1
Sulfate	0.1
Petroleum Hydrocarbons (mg/l)	1
Total Cyanides (mg/l)	0.005
Total Phenols (mg/l)	0.005
Total Dissolved Solids (mg/l)	10
Metal Results (ug/l)	
Barium, Ba	2
Cadmium, Cd	4
Chromium, Cr	[illegible]
Lead, Pb	40
Silver, Ag	[illegible]
Mineral Results (mg/l)	
[illegible]	
[illegible]	
[illegible]	
Manganese, Mn	[illegible]
Potassium, K	[illegible]
Sodium, Na	[illegible]

APPENDIX O

Well Surveyed Locations and Static Water Levels

TABLE O-1. Monitoring Well Survey Data

Northing	Easting	Measuring Point Elevation Above MSL	Well No.
		131.79	MAFB 1[1]
		130.87	MAFB 2[1]
		128.12	MAFB 3[1]
		73.35	MAFB 7[1]
		74.70	MAFB 8[1]
		78.00	MAFB 9[1]
		81.14	MAFB 10[1]
		80.40	MAFB 11[1]
+318701.8520	+2198615.1554	39.06	MAFB 40 SPC[2]
+318540.1192	+2198654.0814	73.16	MAFB 41 SPC
+318486.6190	+2198907.5150	74.74	MAFB 42 SPC
+319691.1421	+2199034.9053	74.97	MAFB 43 SPC
+319547.2307	+2199459.4988	75.49	MAFB 44 SPC
+319985.3504	+2200408.9127	76.94	MAFB 45 SPC
+318732.2644	+2195792.2534	68.31	MAFB 46 SPC
+323371.4433	+2195716.8172	76.53	MAFB 47 SPC
+326267.5156	+2195597.9096	75.32	MAFB 48 SPC
+330762.3108	+2198603.5253	91.47	MAFB 49 SPC
+324395.8494	+2209121.7980	123.43	MAFB 50 SPC
+324161.4741	+2209932.8752	126.35	MAFB 51 SPC
+322709.9286	+2208529.9455	122.08	MAFB 52 SPC
+323287.1250	+2207931.7169	133.43	MAFB 53 SPC
+323727.3685	+2207554.4505	117.70	MAFB 54 SPC
+318686.2202	+2198607.6178	39.19	MAFB 55 SPC
+318539.2757	+2198664.4422	73.40	MAFB 56 SPC
+318483.0342	+2198923.1022	74.38	MAFB 57 SPC
+318776.2049	+2198906.4809	74.60	MAFB 58 SPC
+318753.7210	+2195772.4498	69.10	MAFB 59 SPC
+323352.1763	+2195722.1841	76.90	MAFB 60 SPC
+324653.1127	+2195660.5754	78.13	MAFB 61 SPC
+325099.6473	+2195641.1814	78.99	MAFB 62 SPC
+326239.7576	+2195593.6664	75.08	MAFB 63 SPC
+328423.5801	+2212205.1901	123.30	MAFB 64 SPC
+329150.8096	+2211762.6960	128.71	MAFB 65 SPC
+329942.6525	+2203610.2292	93.03	MAFB 66 SPC
+323699.1866	+2209141.3529	129.08	MAFB 67 SPC
+323959.7734	+2209065.6134	130.77	MAFB 68 SPC

TABLE O-1. (con't)

Northing	Easting	Measuring Point Elevation Above MSL	Well No.
+323975.6634	+2209554.5143	133.40	MAFB 69 SPC
+322691.4699	+2208493.7103	123.51	MAFB 70 SPC
+323318.7865	+2207925.9875	128.22	MAFB 71 SPC
+323756.7236	+2207543.2596	116.95	MAFB 72 SPC
+329890.9985	+2203629.1053	92.27	MAFB 73 SPC[3]
+329144.6370	+2211771.3635	127.38	MAFB 75 SPC
+328435.9555	+2212192.1131	123.33	MAFB 76 SPC

NOTES:

(1) Wells drilled and surveyed during Phase II, Stage 1 Northing and Easting data are not available.

(2) Northing and Easting used to laterally locate these wells with reference to the California State Plane Coordinate System.

(3) Well MAFB-74 was not installed.

TABLE O-2. Static Water Levels

Well No.	Measuring Point Elevation (Ft. MSL)	Water Level Elevation, Ft. Above MSL		
		Nov 86	Dec 86	Jan 87
MAFB 1	131.39	26.33	19.21	20.23
MAFB 2	130.87	24.98	19.19	20.26
MAFB 3	128.12	18.15	18.49	19.67
MAFB 7*	73.35	2.42	0.08	1.10
MAFB 8	74.70	-2.04	-2.11	-0.77
MAFB 9	78.00	12.89	8.12	7.38
MAFB 10	81.14	5.85	5.71	6.13
MAFB 11	80.40	5.16	4.79	4.97
MAFB 12	96.53	--	25.19	--
MAFB 13	91.89	--	22.12	--
MAFB 14	92.59	--	**	--
MAFB 15	92.20	--	**	--
MAFB 16	120.04	--	20.43	--
MAFB 17	121.66	--	20.94	--
MAFB 18	119.68	--	20.83	--
MAFB 19	131.41	--	39.82	--
MAFB 20	127.06	--	66.81	--
MAFB 21	127.77	--	40.61	--
MAFB 22	137.95	--	33.06	--
MAFB 23	132.52	--	31.68	--
MAFB 24	126.67	--	36.44	--
MAFB 25	125.34	--	36.97	--
MAFB 26	122.83	--	37.91	--
MAFB 27C	147.58	--	15.41	--
MAFB 28	134.79	--	7.41	--
MAFB 29	130.71	--	7.54	--
MAFB 30	133.90	--	8.22	--
MAFB 31	93.01	--	20.60	--
MAFB 32	93.33	--	20.07	--
MAFB 33	80.81	--	9.39	--
MAFB 34	80.97	--	8.62	--
MAFB 35	80.14	--	8.10	--
MAFB 36	81.85	--	8.24	--
MAFB 37	78.63	--	5.28	--
MAFB 38	77.79	--	20.08	--
MAFB 39	75.03	--	22.09	--
MAFB 40	39.06	-3.31	-2.44	-1.07
MAFB 41	73.16	-3.56	-2.65	-1.21
MAFB 42	74.74	-3.10	-2.15	-0.73
MAFB 43	74.97	-2.85	-1.56	-0.22
MAFB 44	75.49	26.84	26.48	25.96
MAFB 45	76.94	26.90	24.78	24.86
MAFB 46	68.31	-0.42	-0.72	-0.55

*MAFB 4, 5, and 6 were replaced with wells directly upgradient from sites. These wells were not measured during Stage 3.

**Note MAFB 14 and MAFB 15 are located on runway and were not measured during Stage 3.

TABLE O-2. (continued)

Well No.	Measuring Point Elevation (Ft. MSL)	Water Level Elevation, Ft. Above MSL Nov 86	Dec 86	Jan 87
MAFB 47	76.53	1.93	2.40	2.44
MAFB 48	75.32	7.59	5.67	6.27
MAFB 49	91.47	9.09	14.23	14.94
MAFB 50	123.43	18.94	19.46	20.57
MAFB 51	126.35	21.18	21.76	22.79
MAFB 52	122.08	--	14.94	16.17
MAFB 53	133.43	17.34	17.83	18.88
MAFB 54	117.70	15.67	14.74	15.86
MAFB 55	39.19	-5.70	-4.09	-2.38
MAFB 56	73.40	-6.01	-4.06	-2.46
MAFB 57	74.38	-5.59	-4.21	-2.40
MAFB 58	74.60	-5.36	-6.06	-2.17
MAFB 59	69.10	-7.37	-6.03	-4.53
MAFB 60	76.90	-5.63	-3.69	-1.72
MAFB 61	78.13	-4.50	-2.37	-0.38
MAFB 62	78.99	-4.82	-0.99	-0.92
MAFB 63	75.08	1.92	0.34	1.19
MAFB 64	123.30	21.13	21.99	23.79
MAFB 65	128.71	24.85	24.35	26.33
MAFB 66	93.03	7.94	9.64	11.57
MAFB 67	129.08	19.21	19.23	20.68
MAFB 68	130.77	19.20	18.31	20.30
MAFB 69	133.40	19.29	20.40	22.13
MAFB 70	123.51	18.98	21.78	18.08
MAFB 71	128.22	12.03	13.14	14.30
MAFB 72	116.95	14.52	15.92	17.55
MAFB 73	92.27	22.66	21.82	22.43
MAFB 75	127.38	37.96	37.92	38.49
MAFB 76	123.33	34.37	33.87	34.81

APPENDIX P

Mather Production Wells
Sampling Data 1985-1987

Chemical Listing with Appropriate Abbreviations for Water Database

Abbreviation	Chemical
TCE	Trichlorethene
CTET	Carbon Tetrachloride
PCE	Tetrachloroethene
11DCE	1,1 Dichloroethene
11DCA	1,1 Dichloroethane
T12DCE	Trans-1,2-Dichloroethene
12DCA	1,2-Dichloroethane
111TCA	1,1,1-Trichloroethane
1122TCA	1,1,2,2-Tetrachloroethane
CF	Chloroform
VCL	Vinyl Chloride
12DCPA	1,2 Dichloropropane
BRF	Bromoform
DBCMA	Dibromochloromethane
BDCMA	Bromodichloromethane
DCDFMA	Dichlorodifluromethane
CMA	Chloromethane
TCFMA	Trichlorofluromethane
MECL2	Methylene Chloride
C13DCPE	cis-1,3-Dichloropropene
BENZ	Benzene
CLBENZ	Chlorobenzene
TOLU	Toluene
EBENZ	Ethylbenzene

ATCH 1

[Environmental] Health and Welfare Agency — Department of Health Services

Anlab
ANALYTICAL LABORATORY

system = chanel

PURGEABLE ORGANIC ANALYSES (Volatiles)

te of Report: 09/30/87 — Lab Sample ID No. 114192-1
oratory Name: ANLAB — Signature Lab Director: [signature]
e of Sampler: SR A. DEGUILLA (MATHER AFB) — Sampler Employed By: MATHER AFB, CA
e/Time Sample Collected: 09/16/87 — Date/Time Sample Received @ Lab: 3:13P 09/16/87 — Were Holding Times Observed? YES
t Methods: EPA 601 — Were all the constituents listed below quantified? No

tem e: MAIN BASE — System Number: 34-706
cription of pling Point: MB #1 GP-87-0439 — County Name: SACRAMENTO
e/No. Of Sample rce: 0127-PC-001 — Station Number: 08N/06E-11B01 M
e & e of ple: 8|7|0|9|1|6| | | | | (Y Y M M D D T T T T) — Water Type: G (G/S) — User ID: — Submitted to SWQIS By:

ce an "X" in box to delete all data for this station/date/time. ☐

PORTING UNITS	CONSTITUENT	T T	STORET CODE	ANALYSES RESULTS	DETECTION LIMIT
	Date Analyses Completed		73672	8 7 0 9 2 1 (Y Y M M D D)	
	Analyzing Agency Code (Lab)		28		
	Intensive Survey Number		116		
g/L	~~Benzene~~		34030	N.A	0.50
g/L	~~Bromodichloromethane~~		32101	N.D	0.50
g/L	~~Bromoform~~		32104		0.50
g/L	[redacted]		34413		0.50
g/L	~~Carbon~~ tetrachloride		32102		0.50
g/L	[redacted]		34301		0.50
g/L	[redacted]		34311		0.50
g/L	[redacted] ether		34576		1.00
g/L	[redacted]		32106		0.50
g/L	~~Chloromethane~~		34418		0.50
g/L	[redacted]ther		34273		5.00
g/L	~~Dibromochloromethane~~		32105		0.50
g/L	[redacted]nzene		34536		0.50
g/L	[redacted]ene		34566		0.50
g/L	[redacted]zene		34571		0.50
g/L	[redacted]luoromethane		34668		0.50
g/L	~~1,1-Dichl~~oroethane (1,1-DCA)		34496		0.50
g/L	~~1,2-Dichl~~oroethane (1,2-DCA)		34531		0.50
g/L	~~1,1-Dichl~~oroethene (1,1-DCE)		34501		0.20
g/L	~~trans-1,2-D~~ichloroethene		34546	N.D	0.50

Purgeable Organic Analyses (Continued) — PAGE 2 OF 2

SYSTEM NAME & NUMBER k-9

REPORTING UNITS	CONSTITUENT	T T	STORET CODE	ANALYSES RESULTS	DETECTION LIMIT
ug/L	~~1,2-Dich~~loropropane		34541	N.D	0.50
ug/L	~~cis-1,3-~~Dichloropropene		34704		0.50
ug/L	[redacted]		34699	N.D	0.50
ug/L	~~Ethylbenzene~~		34371	N.A	0.50
ug/L	~~Methylene~~ chloride		34423	N.D	0.50
ug/L	[redacted]		81595		1.00
ug/L	[redacted]		81596		1.00
ug/L	~~1,1,2,2-Te~~trachloroethane		34516		0.50
ug/L	~~Tetra~~chloroethene (PCE)		34475	N.D	0.50
ug/L	~~Toluene~~		34010	N.A	0.50
ug/L	~~1,1,1-T~~richloroethane		34506	N.D	0.50
ug/L	[redacted]		34511		0.50
ug/L	~~Trich~~loroethane (TCE)		39180		0.50
ug/L	~~Trichloro~~fluoromethane		34488		0.50
ug/L	~~Vinyl~~ chloride		39175	N.D	1.00
ug/L	~~Xylenes~~		81551	N.A	0.50
ug/L	~~Total Trihalomethanes~~		82080	N.D	0.50

Note any unidentified peaks below.

not included in database but sampled for.

39/55

1. The report from the drinking water well database is attached. It includes the results of testing from 1985 to 1987. It is divided into three parts with each part containing the results for eight (out of 24) contaminants of interest.

2. WELL column identifies which well was tested using the following code:

FH1 - FH6	= family housing wells
FHD	= family housing distribution system
MB1 - MB4	= main base wells
MBD	= main base distribution system
K-9	= K-9 well
K-9D	= K-9 distribution system

3. DATE column identifies when the sample was taken in the format YYMMDD (i.e. year year month month day day). The following applies to the dates used:

DATE	Test Lab	Tests run	
841102	Anlab	601	(on new FH4 well)
850108	Radian	601, 602	
850130	Radian	601	(for FH2 did 601,602)
850304	OEHL	601, 602	
850326	McClellan	601	
850603	OEHL	601	
850699	Stage 1 lab	601, 602	(duplicates of 850603)
850627	Stage 1 lab	601, 602	(on well FH5)
850708	Calif Analytical Lab	601	
850812	Calif Analytical Lab	602	(on new FH4 well)
860127	Anlab	601	
860416	Anlab	601	
860624	Anlab	601	
860729	OEHL (TMA/EAL)	601, 602	(repeat 602 done 870325)
860917	Anlab	601	
861210	Anlab	601	
861299	Stage 3 lab	601, 602	(duplicates of 861210)
870325	Anlab	601	
870325	OEHL	602	(for FHD, MBD, K-9D)
870716	Anlab	601	
870916	Anlab	601	

4. The headings for the remaining eight columns identify the contaminant according to the abbreviations listed in Attachment 1. Entries in the column include the numeric value in parts per billion (ppb) or micrograms per liter (ug/L), TRACE, ND = "none detected", or "--" = not sampled.

WELL TEST RESULTS (part 1 of 3)

WELL	DATE	TCE	CTET	PCE	11DCE	11DCA	T12DCE	12DCA	111TCA
FH1	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850214	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850328	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850603	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850699	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850708	ND	ND	ND	ND	ND	ND	ND	ND
FH1	860127	ND	ND	ND	ND	ND	ND	ND	ND
FH1	860416	ND	ND	ND	ND	ND	ND	ND	ND
FH1	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH1	860729	ND	ND	ND	ND	ND	ND	ND	0.17
FH1	860917	ND	ND	ND	ND	ND	ND	ND	ND
FH1	861210	ND	ND	ND	ND	ND	ND	ND	ND
FH1	861299	ND	ND	ND	ND	ND	ND	2.8	ND
FH1	870325	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850130	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850304	ND	ND	ND	ND	ND	ND	0.4	ND
FH2	850326	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850603	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850699	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850708	ND	ND	ND	ND	ND	ND	ND	ND
FH2	860127	ND	ND	ND	ND	ND	ND	ND	0.51
FH2	860416	ND	ND	ND	ND	ND	ND	ND	ND
FH2	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH2	860729	ND	ND	ND	ND	ND	ND	ND	0.10
FH2	860917	ND	ND	ND	ND	ND	ND	ND	ND
FH2	870325	ND	ND	ND	ND	ND	ND	ND	ND
FH2	870716	ND	ND	ND	ND	ND	ND	ND	ND
FH2	870716	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850130	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850304	ND	ND	ND	ND	ND	ND	1.1	ND
FH3	850326	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850603	ND	ND	ND	ND	ND	ND	ND	1.9
FH3	850699	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850708	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860127	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860416	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860729	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860917	ND	ND	ND	ND	ND	ND	ND	ND
FH3	861210	ND	ND	ND	ND	ND	ND	ND	ND
FH3	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH3	870325	ND	ND	ND	ND	ND	ND	ND	ND
FH3	870716	ND	ND	ND	ND	ND	ND	ND	ND
FH3	870916	ND	ND	ND	ND	ND	ND	ND	ND
FH4	871102	ND	ND	ND	ND	ND	ND	ND	ND
FH4	[illegible]	--	--	--	--	--	--	--	--
FH4	860416	ND	ND	ND	ND	ND	ND	ND	ND
FH4	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH4	860729	ND	ND	ND	ND	ND	ND	ND	ND

WELL TEST RESULTS (part 2 of 3)

WELL	DATE	1122TCA	CF	VCL	12DCFA	BRF	DBCMA	BDCMA	DCDFMA
FH1	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850314	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850326	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850603	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850699	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850708	ND	ND	ND	ND	ND	ND	ND	ND
FH1	860127	ND	ND	ND	ND	ND	ND	ND	ND
FH1	860416	ND	ND	ND	ND	ND	ND	ND	ND
FH1	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH1	860729	ND	ND	ND	ND	ND	ND	ND	ND
FH1	860917	ND	ND	ND	ND	ND	ND	ND	ND
FH1	861210	ND	ND	ND	ND	ND	ND	ND	ND
FH1	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH1	870325	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850130	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850304	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850326	ND	TRACE	ND	ND	ND	ND	ND	ND
FH2	850603	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850699	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850708	ND	ND	ND	ND	ND	ND	ND	ND
FH2	860127	ND	ND	ND	ND	ND	ND	ND	ND
FH2	860416	ND	ND	ND	ND	ND	ND	ND	ND
FH2	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH2	860729	ND	ND	ND	ND	ND	ND	1.08	ND
FH2	860917	ND	ND	ND	ND	ND	ND	ND	ND
FH2	870325	ND	ND	ND	ND	ND	ND	ND	ND
FH2	870716	ND	ND	ND	ND	ND	ND	ND	ND
FH2	870916	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850130	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850304	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850326	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850603	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850699	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850708	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860127	ND	0.31	ND	ND	ND	ND	ND	ND
FH3	860416	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860729	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860917	ND	ND	ND	ND	ND	ND	ND	ND
FH3	861210	ND	ND	ND	ND	ND	ND	ND	ND
FH3	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH3	870325	ND	ND	ND	ND	ND	ND	ND	ND
FH3	870716	ND	ND	ND	ND	ND	ND	ND	ND
FH3	870916	ND	ND	ND	ND	ND	ND	ND	ND
FH4	841102	ND	ND	ND	ND	ND	ND	ND	ND
FH4	850812	--	--	--	--	--	--	--	--
FH4	860416	ND	ND	ND	ND	ND	ND	ND	ND
FH4	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH4	860729	ND	ND	ND	ND	ND	ND	ND	ND

WELL TEST RESULTS (part 3 of 3)

WELL	DATE	CMA	TCFMA	MECL2	C13DCPE	BENZ	CLBENZ	TOLU	EBENZ
FH1	850108	ND	ND	ND	ND	1.0	ND	ND	ND
FH1	850314	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850326	ND	ND	ND	ND	--	--	--	--
FH1	850603	ND	ND	ND	ND	--	--	--	--
FH1	850699	ND	ND	ND	ND	ND	ND	0.74	ND
FH1	850708	ND	ND	ND	ND	--	--	--	--
FH1	860127	ND	ND	ND	ND	--	--	--	--
FH1	860416	ND	ND	ND	ND	--	--	--	--
FH1	860624	ND	ND	ND	ND	--	--	--	--
FH1	860729	ND	ND	0.26	ND	ND	ND	ND	ND
FH1	860917	ND	ND	ND	ND	--	--	--	--
FH1	861210	ND	ND	ND	ND	--	--	--	--
FH1	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH1	870325	ND	ND	ND	ND	--	--	--	--
FH2	850108	ND	ND	2.8	ND	ND	ND	ND	ND
FH2	850130	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850304	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850326	ND	ND	ND	ND	--	--	--	--
FH2	850603	ND	ND	0.7	ND	--	--	--	--
FH2	850699	ND	ND	ND	ND	ND	ND	0.94	ND
FH2	850708	ND	ND	ND	ND	--	--	--	--
FH2	860127	ND	ND	ND	ND	--	--	--	--
FH2	860416	ND	ND	ND	ND	--	--	--	--
FH2	860624	ND	ND	ND	ND	--	--	--	--
FH2	860729	ND	ND	ND	ND	ND	ND	ND	ND
FH2	860917	ND	ND	ND	ND	--	--	--	--
FH2	870325	ND	ND	ND	ND	--	--	--	--
FH2	870716	ND	ND	ND	ND	--	--	--	--
FH2	870916	ND	ND	ND	ND	--	--	--	--
FH3	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850130	ND	ND	ND	ND	--	--	--	--
FH3	850304	ND	ND	TRACE	ND	ND	ND	ND	ND
FH3	850326	ND	ND	ND	ND	--	--	--	--
FH3	850603	ND	ND	0.5	ND	--	--	--	--
FH3	850699	ND	ND	ND	ND	ND	ND	0.94	ND
FH3	850708	ND	ND	ND	ND	--	--	--	--
FH3	860127	ND	ND	ND	ND	--	--	--	--
FH3	860416	ND	ND	ND	ND	--	--	--	--
FH3	860624	ND	ND	ND	ND	--	--	--	--
FH3	860729	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860917	ND	ND	ND	ND	--	--	--	--
FH3	861210	ND	ND	ND	ND	--	--	--	--
FH3	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH3	870325	ND	ND	ND	ND	--	--	--	--
FH3	870716	ND	ND	ND	ND	--	--	--	--
FH3	870916	ND	ND	ND	ND	--	--	--	--
FH4	841102	ND	ND	ND	ND	--	--	--	--
FH4	850812	--	--	--	--	ND	ND	ND	ND
FH4	860416	ND	ND	ND	ND	--	--	--	--
FH4	860624	ND	ND	ND	ND	--	--	--	--
FH4	860729	ND	ND	ND	ND	ND	ND	ND	ND

WELL TEST RESULTS (part 3 of 3)

WELL	DATE	CMA	TCFMA	MECL2	C12DCFE	BENZ	CLBENZ	TOLU	EBENZ
FH1	850108	ND	ND	ND	ND	1.0	ND	ND	ND
FH1	850314	ND	ND	ND	ND	ND	ND	ND	ND
FH1	850326	ND	ND	ND	ND	--	--	--	--
FH1	850603	ND	ND	ND	ND	--	--	--	--
FH1	850699	ND	ND	ND	ND	ND	ND	0.94	ND
FH1	850708	ND	ND	ND	ND	--	--	--	--
FH1	860127	ND	ND	ND	ND	--	--	--	--
FH1	860416	ND	ND	ND	ND		--	--	--
FH1	860624	ND	ND	ND	ND	--	--	--	--
FH1	860729	ND	ND	0.26	ND	ND	ND	ND	ND
FH1	860917	ND	ND	ND	ND	--	--	--	--
FH1	861210	ND	ND	ND	ND	--	--	--	--
FH1	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH1	870325	ND	ND	ND	ND	--	--	--	--
FH2	850108	ND	ND	2.8	ND	ND	ND	ND	ND
FH2	850130	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850304	ND	ND	ND	ND	ND	ND	ND	ND
FH2	850326	ND	ND	ND	ND	--	--	--	--
FH2	850603	ND	ND	0.7	ND	--	--	--	--
FH2	850699	ND	ND	ND	ND	ND	ND	0.94	ND
FH2	850708	ND	ND	ND	ND	--	--	--	--
FH2	860127	ND	ND	ND	ND	--	--	--	--
FH2	860416	ND	ND	ND	ND	--	--	--	--
FH2	860624	ND	ND	ND	ND	--	--	--	--
FH2	860729	ND	ND	ND	ND	ND	ND	ND	ND
FH2	860917	ND	ND	ND	ND	--	--	--	--
FH2	870325	ND	ND	ND	ND	--	--	--	--
FH2	870716	ND	ND	ND	ND	--	--	--	--
FH2	870916	ND	ND	ND	ND	--	--	--	--
FH3	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH3	850130	ND	ND	ND	ND	--	--	--	--
FH3	850304	ND	ND	TRACE	ND	ND	ND	ND	ND
FH3	850326	ND	ND	ND	ND	--	--	--	--
FH3	850603	ND	ND	0.5	ND	--	--	--	--
FH3	850679	ND	ND	ND	ND	ND	ND	0.94	ND
FH3	850708	ND	ND	ND	ND	--	--	--	--
FH3	860127	ND	ND	ND	ND	--	--	--	--
FH3	860416	ND	ND	ND	ND	--	--	--	--
FH3	860624	ND	ND	ND	ND	--	--	--	--
FH3	860729	ND	ND	ND	ND	ND	ND	ND	ND
FH3	860917	ND	ND	ND	ND	--	--	--	--
FH3	861210	ND	ND	ND	ND	--	--	--	--
FH3	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH3	870325	ND	ND	ND	ND	--	--	--	--
FH3	870716	ND	ND	ND	ND	--	--	--	--
FH3	870916	ND	ND	ND	ND	--	--	--	--
FH4	841102	ND	ND	ND	ND	--	--	--	--
FH4	850812	--	--	--	--	ND	ND	ND	ND
FH4	860416	ND	ND	ND	ND	--	--	--	--
FH4	860624	ND	ND	ND	ND	--	--	--	--
FH4	860729	ND	ND	ND	ND	ND	ND	ND	ND

WELL TEST RESULTS (part 2 of 3)

WELL	DATE	1122TCA	CF	VCL	12DCPA	BRF	DBCMA	BDCMA	DCDFMA
FH4	860917	ND	ND	ND	ND	ND	ND	ND	ND
FH4	861210	ND	ND	ND	ND	ND	ND	ND	ND
FH4	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH4	870325	ND	ND	ND	ND	ND	ND	ND	ND
FH4	870716	ND	ND	ND	ND	ND	ND	ND	ND
FH4	870916	ND	ND	ND	ND	ND	ND	ND	ND
FH5	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH5	850304	ND	24.5	ND	ND	ND	ND	6.0	ND
FH5	850326	ND	ND	ND	ND	ND	ND	ND	ND
FH5	850627	ND	ND	ND	ND	ND	ND	ND	ND
FH5	850708	ND	7.5	ND	ND	ND	ND	ND	ND
FH5	860416	ND	ND	ND	ND	ND	ND	ND	ND
FH5	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH5	860729	ND	0.37	ND	ND	ND	ND	ND	ND
FH5	860917	ND	ND	ND	ND	ND	ND	ND	ND
FH5	861210	ND	ND	ND	ND	ND	ND	ND	ND
FH5	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH5	870325	ND	ND	ND	ND	ND	ND	ND	ND
FH5	870716	ND	ND	ND	ND	ND	ND	ND	ND
FH5	870916	ND	ND	ND	ND	ND	ND	ND	ND
FH6	850108	ND	ND	ND	ND	ND	ND	ND	ND
FH6	850304	ND	ND	ND	ND	ND	ND	ND	ND
FH6	850326	ND	ND	ND	ND	ND	ND	ND	ND
FH6	850603	ND	TRACE	ND	ND	ND	ND	ND	ND
FH6	850699	ND	ND	ND	ND	ND	ND	ND	ND
FH6	850708	ND	ND	ND	ND	ND	ND	ND	ND
FH6	860127	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	[illegible]	ND	ND	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]
FH6	860624	ND	ND	ND	ND	ND	ND	ND	ND
FH6	860729	ND	0.06	ND	ND	ND	ND	ND	ND
FH6	860917	ND	ND	ND	ND	ND	ND	ND	ND
FH6	861210	ND	ND	ND	ND	ND	ND	ND	ND
FH6	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH6	870325	ND	ND	ND	ND	ND	ND	ND	ND
FH6	870716	ND	ND	ND	ND	ND	ND	ND	ND
FH6	870916	ND	ND	ND	ND	ND	ND	ND	ND
FHD	850326	ND	1.23	ND	ND	TRACE	1.15	0.97	ND
FHD	860729	ND	6.02	ND	ND	0.37	1.41	3.40	ND
FHD	870325	--	--	--	--	--	--	--	--
K-9	850109	ND	ND	ND	ND	ND	ND	ND	ND
K-9	850304	ND	ND	ND	ND	ND	ND	ND	ND
K-9	850326	ND	ND	ND	ND	ND	ND	ND	ND
K-9	850603	ND	ND	ND	ND	ND	ND	ND	ND
K-9	850708	ND	ND	ND	ND	ND	ND	ND	ND
K-9	860127	ND	ND	ND	ND	ND	ND	ND	ND
K-9	860416	ND	ND	ND	ND	ND	ND	ND	ND
K-9	860624	ND	ND	ND	ND	ND	ND	ND	ND
K-9	860729	ND	ND	ND	ND	ND	ND	ND	ND
K-9	860917	ND	ND	ND	ND	ND	ND	ND	ND
K-9	861210	ND	ND	ND	ND	ND	ND	ND	ND
K-9	861299	ND	0.7	ND	ND	ND	ND	ND	ND

WELL TEST RESULTS (part 3 of 3)

WELL	DATE	CMA	TCFMA	MECL2	C12DCPE	BENZ	CLBENZ	TOLU	EBENZ
FH4	860917	ND	ND	ND	ND	--	--	--	--
FH4	861210	ND	ND	ND	ND	--	--	--	--
FH4	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH4	870325	ND	ND	ND	ND	--	--	--	--
FH4	870716	ND	ND	ND	ND	--	--	--	--
FH4	870916	ND	ND	ND	ND	--	--	--	--
FH5	850108	ND	5.1	ND	ND	ND	ND	ND	ND
FH5	850304	ND	ND	ND	ND	ND	ND	ND	ND
FH5	850326	ND	ND	ND	ND	--	--	--	--
FH5	850627	ND	ND	ND	ND	ND	ND	0.60	ND
FH5	850708	ND	ND	ND	ND	--	--	--	--
FH5	860416	ND	ND	ND	ND	--	--	--	--
FH5	860624	ND	ND	ND	ND	--	--	--	--
FH5	860729	ND	ND	ND	ND	ND	ND	ND	ND
FH5	860917	ND	ND	ND	ND	--	--	--	--
FH5	861210	ND	ND	ND	ND	--	--	--	--
FH5	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH5	870325	ND	ND	ND	ND	--	--	--	--
FH5	870716	ND	ND	ND	ND	--	--	--	--
FH5	870916	ND	ND	ND	ND	--	--	--	--
FH6	850108	ND	ND	ND	ND	2.7	ND	ND	ND
FH6	850304	ND	ND	ND	ND	ND	ND	ND	ND
FH6	850326	ND	ND	ND	ND	--	--	--	--
FH6	850603	ND	ND	0.3	ND	--	--	--	--
FH6	850699	ND	ND	ND	ND	ND	ND	0.74	ND
FH6	850708	ND	ND	ND	ND	--	--	--	--
FH6	860127	ND	ND	ND	ND	--	--	--	--
FH6	860416	ND	ND	ND	ND	--	--	--	--
FH6	860624	ND	ND	ND	ND	--	--	--	--
FH6	860729	ND	ND	ND	ND	ND	ND	ND	ND
FH6	860917	ND	ND	ND	ND	--	--	--	--
FH6	861210	ND	ND	ND	ND	--	--	--	--
FH6	861299	ND	ND	ND	ND	ND	ND	ND	ND
FH6	870325	ND	ND	ND	ND	--	--	--	--
FH6	870716	ND	ND	ND	ND	--	--	--	--
FH6	870916	ND	ND	ND	ND	--	--	--	--
FHD	850326	ND	ND	ND	ND	--	--	--	--
FHD	860729	ND	ND	0.28	ND	1.11	ND	ND	ND
FHD	870325	--	--	--	--	ND	ND	ND	ND
K-9	850109	ND	ND	ND	ND	ND	ND	ND	ND
K-9	850304	ND	ND	TRACE	ND	ND	ND	ND	ND
K-9	850326	ND	ND	ND	ND	--	--	--	--
K-9	850603	ND	ND	0.2	ND	--	--	--	--
K-9	850708	ND	ND	ND	ND	--	--	--	--
K-9	860127	ND	ND	ND	ND	--	--	--	--
K-9	860416	ND	ND	ND	ND	--	--	--	--
K-9	860624	ND	ND	ND	ND	--	--	--	--
K-9	860729	ND	ND	0.27	ND	ND	ND	ND	ND
K-9	860917	ND	ND	ND	ND	--	--	--	--
K-9	861210	ND	ND	ND	ND	--	--	--	--
K-9	861299	ND	ND	ND	ND	ND	ND	ND	ND

WELL TEST RESULTS (part 1 of 3)

WELL	DATE	TCE	CTET	PCE	11DCE	11DCA	T12DCE	12DCA	111TCA
K-9	870325	ND	ND	ND	ND	ND	ND	ND	ND
K-9	870716	ND	ND	ND	ND	ND	ND	ND	ND
K-9	870916	ND	ND	ND	ND	ND	ND	ND	ND
K-9D	850326	ND	ND	ND	ND	ND	ND	ND	ND
K-9D	860729	ND	ND	ND	ND	ND	ND	ND	ND
K-9D	870325	--	--	--	--	--	--	--	--
MB1	850108	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850130	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850304	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850326	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850603	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850699	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850708	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860127	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860416	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860624	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860729	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860917	ND	ND	ND	ND	ND	ND	ND	ND
MB1	861210	ND	ND	ND	ND	ND	ND	ND	ND
MB1	861299	ND	ND	ND	ND	ND	ND	ND	ND
MB1	870325	ND	ND	ND	ND	ND	ND	ND	ND
MB1	870716	ND	ND	ND	ND	ND	ND	ND	ND
MB1	870916	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850108	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850304	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850326	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850603	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850699	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850708	ND	ND	ND	ND	ND	ND	ND	ND
MB2	860729	ND	ND	ND	ND	ND	ND	ND	ND
MB2	860917	ND	ND	ND	ND	ND	ND	ND	ND
MB2	870916	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850108	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850130	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850304	ND	ND	ND	ND	ND	ND	[illegible]	ND
MB3	850326	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850603	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850699	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850708	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860127	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860416	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860624	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860729	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860917	ND	ND	ND	ND	ND	ND	ND	ND
MB3	870716	ND	ND	ND	ND	ND	ND	ND	ND
MB3	870916	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850108	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850130	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850304	ND	2.2	ND	ND	ND	ND	3.7	ND
MB4	850326	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850603	ND	ND	ND	ND	ND	ND	ND	ND

WELL TEST RESULTS (part 2 of 3)

WELL	DATE	1122TCA	CF	VCL	12DCMA	BRF	DBCMA	BDCMA	DCDFMA
K-9	870325	ND	ND	ND	ND	ND	ND	ND	ND
K-9	870716	ND	ND	ND	ND	ND	ND	ND	ND
K-9	870916	ND	ND	ND	ND	ND	ND	ND	ND
K-9D	850326	ND	ND	ND	ND	ND	ND	ND	ND
K-9D	860729	ND	2.03	ND	ND	ND	0.54	1.22	ND
K-9D	870325	--	--	--	--	--	--	--	--
MB1	850108	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850130	ND	2.2	ND	ND	ND	ND	ND	ND
MB1	850304	ND	1.3	ND	ND	ND	ND	ND	ND
MB1	850326	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850603	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850699	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850708	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860127	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860416	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860624	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860729	ND	ND	ND	ND	ND	ND	ND	ND
MB1	860917	ND	ND	ND	ND	ND	ND	ND	ND
MB1	861210	ND	ND	ND	ND	ND	ND	ND	ND
MB1	861299	ND	ND	ND	ND	ND	ND	ND	ND
MB1	870325	ND	ND	ND	ND	ND	ND	ND	ND
MB1	870716	ND	ND	ND	ND	ND	ND	ND	ND
MB1	870916	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850108	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850304	ND	1.5	ND	ND	ND	ND	ND	ND
MB2	850326	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850603	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850699	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850708	ND	ND	ND	ND	ND	ND	ND	ND
MB2	860729	ND	ND	ND	ND	ND	ND	ND	ND
MB2	860917	ND	ND	ND	ND	ND	ND	ND	ND
MB2	870916	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850108	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850130	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850304	ND	1.2	ND	ND	ND	ND	ND	ND
MB3	850326	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850603	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850699	ND	ND	ND	ND	ND	ND	ND	ND
MB3	850708	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860127	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860416	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860624	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860729	ND	ND	ND	ND	ND	ND	ND	ND
MB3	860917	ND	ND	ND	ND	ND	ND	ND	ND
MB3	870716	ND	ND	ND	ND	ND	ND	ND	ND
MB3	870916	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850108	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850130	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850304	ND	1.8	ND	ND	ND	ND	ND	ND
MB4	850326	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850603	ND	ND	ND	ND	ND	ND	ND	ND

WELL TEST RESULTS (part 3 of 3)

WELL	DATE	CMA	TCFMA	MECL2	C12DCE	BENZ	CLBENZ	TOLU	EBENZ
K-9	870325	ND	ND	ND	ND	--	--	--	--
K-9	870716	ND	ND	ND	ND	--	--	--	--
K-9	870916	ND	ND	ND	ND	--	--	--	--
K-9D	850326	ND	ND	ND	ND	--	--	--	--
K-9D	860729	ND	ND	ND	ND	0.76	ND	ND	ND
K-9D	870325	--	--	--	--	ND.	ND	ND	ND
MB1	850108	ND	ND	4.9	ND	ND	ND	ND	ND
MB1	850130	ND	ND	ND	ND	--	--	--	--
MB1	850304	ND	ND	ND	ND	ND	ND	ND	ND
MB1	850326	ND	ND	ND	ND	--	--	--	--
MB1	850603	ND	ND	ND	ND	--	--	--	--
MB1	850699	ND	ND	ND	ND	ND	ND	2.0	ND
MB1	850708	ND	ND	ND	ND	--	--	--	--
MB1	860127	ND	ND	ND	ND	--	--	--	--
MB1	860416	ND	ND	ND	ND	--	--	--	--
MB1	860624	ND	ND	ND	ND	--	--	--	--
MB1	860729	0.69	ND	0.42	ND	ND	ND	ND	ND
MB1	860917	ND	ND	ND	ND	--	--	--	--
MB1	861210	ND	ND	ND	ND	--	--	--	--
MB1	861299	ND	ND	ND	ND	ND	ND	ND	ND
MB1	870325	ND	ND	ND	ND	--	--	--	--
MB1	870716	ND	ND	ND	ND	--	--	--	--
MB1	870916	ND	ND	ND	ND	--	--	--	--
MB2	850108	ND	ND	ND	ND	ND	ND	ND	ND
MB2	850304	ND	ND	2.9	ND	ND	ND	ND	ND
MB2	850326	ND	ND	ND	ND	--	--	--	--
MB2	850603	ND	ND	ND	ND	--	--	--	--
MB2	850699	ND	ND	ND	ND	ND	ND	0.84	ND
MB2	850708	ND	ND	ND	ND	--	--	--	--
MB2	860729	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	[illegible]	ND	ND	ND	ND	--	--	--	--
MB2	870916	ND	ND	ND	ND	--	--	--	--
MB3	850108	ND	ND	ND	ND	3.0	ND	ND	ND
MB3	850130	ND	ND	ND	ND	--	--	--	--
MB3	850304	ND	ND	2.8	ND	ND	ND	ND	ND
MB3	850326	ND	ND	ND	ND	--	--	--	--
MB3	850603	ND	ND	ND	ND	--	--	--	--
MB3	850699	ND	ND	ND	ND	ND	ND	ND	0.35
MB3	850708	ND	ND	ND	ND	--	--	--	--
MB3	860127	ND	ND	ND	ND	--	--	--	--
MB3	860416	ND	ND	ND	ND	--	--	--	--
MB3	860624	ND	ND	ND	ND	--	--	--	--
MB3	860729	ND	ND	0.86	ND	ND	ND	ND	ND
MB3	860917	ND	ND	ND	ND	--	--	--	--
MB3	870716	ND	ND	ND	ND	--	--	--	--
MB3	870916	ND	ND	ND	ND	--	--	--	--
MB4	850108	ND	ND	5.1	ND	4.0	ND	ND	ND
MB4	850130	ND	ND	ND	ND	--	--	--	--
MB4	850304	ND	ND	2.7	ND	ND	ND	ND	ND
MB4	850326	ND	ND	ND	ND	--	--	--	--
MB4	850603	ND	ND	ND	ND	--	--	--	--

WELL TEST RESULTS (part 1 of 3)

WELL	DATE	TCE	CTET	PCE	11DCE	11DCA	T12DCE	12DCA	111TCA
MB4	850699	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850708	ND	ND	ND	ND	ND	ND	ND	ND
MB4	860729	ND	ND	ND	ND	ND	ND	ND	ND
MB4	860917	ND	ND	ND	ND	ND	ND	ND	ND
MB4	861210	ND	ND	ND	ND	ND	ND	ND	ND
MB4	861299	ND	ND	ND	ND	ND	ND	ND	ND
MB4	870325	ND	ND	ND	ND	ND	ND	ND	ND
MB4	870716	ND	ND	ND	ND	ND	ND	ND	ND
MB4	870916	ND	ND	ND	ND	ND	ND	ND	ND
MBD	850326	ND	TRACE	ND	ND	ND	ND	ND	ND
MBD	860729	ND	ND	ND	ND	ND	ND	ND	ND
MBD	870325	--	--	--	--	--	--	--	--

WELL TEST RESULTS (part 2 of 3)

WELL	DATE	1122TCA	CF	VCL	12DCPA	BRF	DBCMA	BDCMA	DCDFMA
MB4	850699	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850703	ND	ND	ND	ND	ND	ND	ND	ND
MB4	850729	ND	0.20	ND	ND	ND	ND	ND	ND
MB4	860717	ND	ND	ND	ND	ND	ND	ND	ND
MB4	861210	ND	ND	ND	ND	ND	ND	ND	ND
MB4	861299	ND	ND	ND	ND	ND.	ND	ND	ND
MB4	870325	ND	ND	ND	ND	ND	ND	ND	ND
MB4	870716	ND	ND	ND	ND	ND	ND	ND	ND
MB4	870916	ND	ND	ND	ND	ND	ND	ND	ND
MBD	850326	ND	TRACE	ND	ND	ND	TRACE	TRACE	ND
MBD	860729	ND	2.52	ND	ND	ND	0.42	1.09	ND
MBD	870325	--	--	--	--	--	--	--	--

WELL TEST RESULTS (part 3 of 3)

WELL	DATE	CMA	TCFMA	MECL2	C12DCFE	BENZ	CLBENZ	TOLU	EBENZ
MB4	850699	ND	ND	ND	ND	ND	ND	1.9	ND
MB4	850708	ND	ND	ND	ND	--	--	--	--
MB4	850729	ND	ND	ND	ND	ND	ND	ND	ND
MB4	860917	ND	ND	ND	ND	--	--	--	--
MB4	861210	ND	ND	ND	ND	--	--	--	--
MB4	861299	ND	ND	ND	ND	ND.	ND	ND	ND
MB4	870325	ND	ND	ND	ND	--	--	--	--
MB4	870716	ND	ND	ND	ND	--	--	--	--
MB4	870916	ND	ND	ND	ND	--	--	--	--
MBD	850326	ND	ND	ND	ND	--	--	--	--
MBD	860729	ND	ND	ND	ND	ND	ND	ND	ND
MBD	870325	--	--	--	--	ND	ND	ND	ND

APPENDIX Q

Soil Gas Data

Job Aerovironment - Mather AFB - Sacremento, CA

TRACER RESEARCH CORPORATION

Date ________ Page______

CONDENSED DATA

CONTAMINANT			TCE			
sample	depth	date	mean ug/l concentration	mean ug/l concentration	mean ug/l concentration	mean ug/l concentrati
SGM1	5'	9/2	0.02			
SGM2	4'	9/2	0.005			
SGM3	3.5'	9/2	0.005			
SGM4	4'	9/2	0.005			
SGM5	4'	9/2	0.009			
SGM6	2'	9/2	0.006			
SGM7	2'	9/2	0.007			
SGM8	3'	9/2	0.003			
SGM9	2.5'	9/2	0.007			
SGM10	5'	9/2	0.005			
SGM11	3'	9/2	0.003			
SGM12	3'	9/2	0.005			
SGM13	4.5'	9/2	0.002			

Notations:
RF response factor
I interference with adjacent peaks
NA not analyzed
E estimated peak area

Summarized by: K. Tolman

Checked by: M. Krotenberg

Proofed by: L. Laplander

Job Aerovironment - Mather AFB - Sacremento, CA

TRACER RESEARCH CORPORATION

Date ________ Page ________

CONDENSED DATA

CONTAMINANT			TCE			
sample	depth	date	mean ug/l concentration	mean ug/l concentration	mean ug/l concentration	mean ug/l concentration
SGM10	5'	9/3	0.0003			
SGM14	4.5'	9/3	<0.0001			
SGM15	3'	9/3	0.0005			
SGM16	5'	9/3	<0.0001			
SGM17	3'	9/3	0.0005			
SGM18	2'	9/3	0.0005			
SGM19	2'	9/3	0.0002			
SGM20	4'	9/3	0.0002			
SGM21	4'	9/3	0.0006			
SGM22	4'	9/3	0.0004			
SGM23	3'	9/3	<0.0001			
SGM24	3'	9/3	0.0002			
SGM25	1.5'	9/3	0.0002			
SGM26	5'	9/3	0.0008			
SGM27	5'	9/3	0.0003			
SGM28	3'	9/3	0.0007			
SGM29	4'	9/3	0.0002			

Notations: RF response factor
I interference with adjacent peaks
NA not analyzed

Summarized by: K. Tolman

Checked by: M. Krotenberg

Proofed by: L. Laplunder

Job Aerovironment - Mather AFB - Sacremento, CA

TRACER RESEARCH CORPORATION

Date ________ Page ________

CONDENSED DATA

CONTAMINANT			F-113	1,1,1-TCA	TCE	PCE
sample	depth	date	mean ug/l concentration	mean ug/l concentration	mean ug/l concentration	mean ug/l concentration
SGL1	5'	9/4	0.004	0.002	0.002	0.0003
SGL2	1'	9/4	0.004	0.0009	0.001	0.0002
SGL3	5'	9/4	I	0.0006	0.0006	0.004
SGL4	2'	9/4	I	0.0008	0.0004	0.0005
SGL5	4'	9/4	I	0.002	0.0007	0.0003
SGL6	3'	9/4	I	0.0008	0.0002	0.0003
SGL7	3'	9/4	I	0.0001	0.0003	0.0004
SGL8	3'	9/4	I	0.0007	0.0004	0.001
SGL9	5'	9/4	I	0.[illegible]07	0.0005	0.002
SGL10	3'	9/4	I	0.0006	0.00008	0.0002

Notations:
RF response factor
I interference with adjacent peaks
NA not analyzed

Summarized by: K. Tolman

Checked by: M. Krotenberg

Proofed by: J. Lujlander

TRACER RESEARCH CORPORATION

Job Aerovironment - Mather AFB - Sacremento, CA

Date ________ Page________

CONDENSED DATA

CONTAMINANT			1,1,1 TCA	TCE	PCE	
sample	depth	date	mean ug/l concentration	mean ug/l concentration	mean ug/l concentration	mean ug/l concentration
SGM30	5'	9/5	0.002	0.009	0.0004	
SGM31	3'	9/5	0.002	0.009	0.0004	
SGM32	3'	9/5	0.001	0.002	0.0003	
SGM33	2'	9/5	0.001	0.002	0.0001	
SGM34	5'	9/5	0.001	<0.00007	0.0002	
SGM35	2'	9/5	0.002	0.002	0.0001	
SGM36	5'	9/5	0.001	0.002	0.00007	
SGM37	3'	9/5	0.0008	0.001	0.001	
SGM38	5'	9/5	0.002	0.002	0.0003	
SGM39	5.5'	9/5	0.001	0.002	0.0003	
SGM40	5'	9/5	0.002	0.004	0.0004	
SGM41	3'	9/5	0.001	0.001	0.0004	
SGM42	4'	9/5	0.001	0.001	0.0001	

Notations: RF response factor
I interference with adjacent peaks
NA not analyzed

Summarized by: K. Tolman

Checked by: M. Krotenberg

Proofed by: L. Laplander

Job Aerovironment - Mather AFB - Sacremento, CA

TRACER RESEARCH CORPORATION

Date________ Page______

CONDENSED DATA

CONTAMINANT			1,1,1 TCA	TCE	PCE	
sample	Depth	date	mean ug/l concentration	mean ug/l concentration	mean ug/l concentration	mean ug/l concentration
SGM43	2'	9/6	0.002	0.002	0.0003	
SGM44	5'	9/6	0.0002	0.0004	0.0003	
SGM45	3'	9/6	0.0007	0.0009	0.0002	
SGM46	4'	9/6	0.0002	<0.0001	0.0001	
SGM47	2'	9/6	0.0004	<0.0001	0.0002	
SGM48	2'	9/6	<0.00009	<0.0001	0.0003	
		9/6				

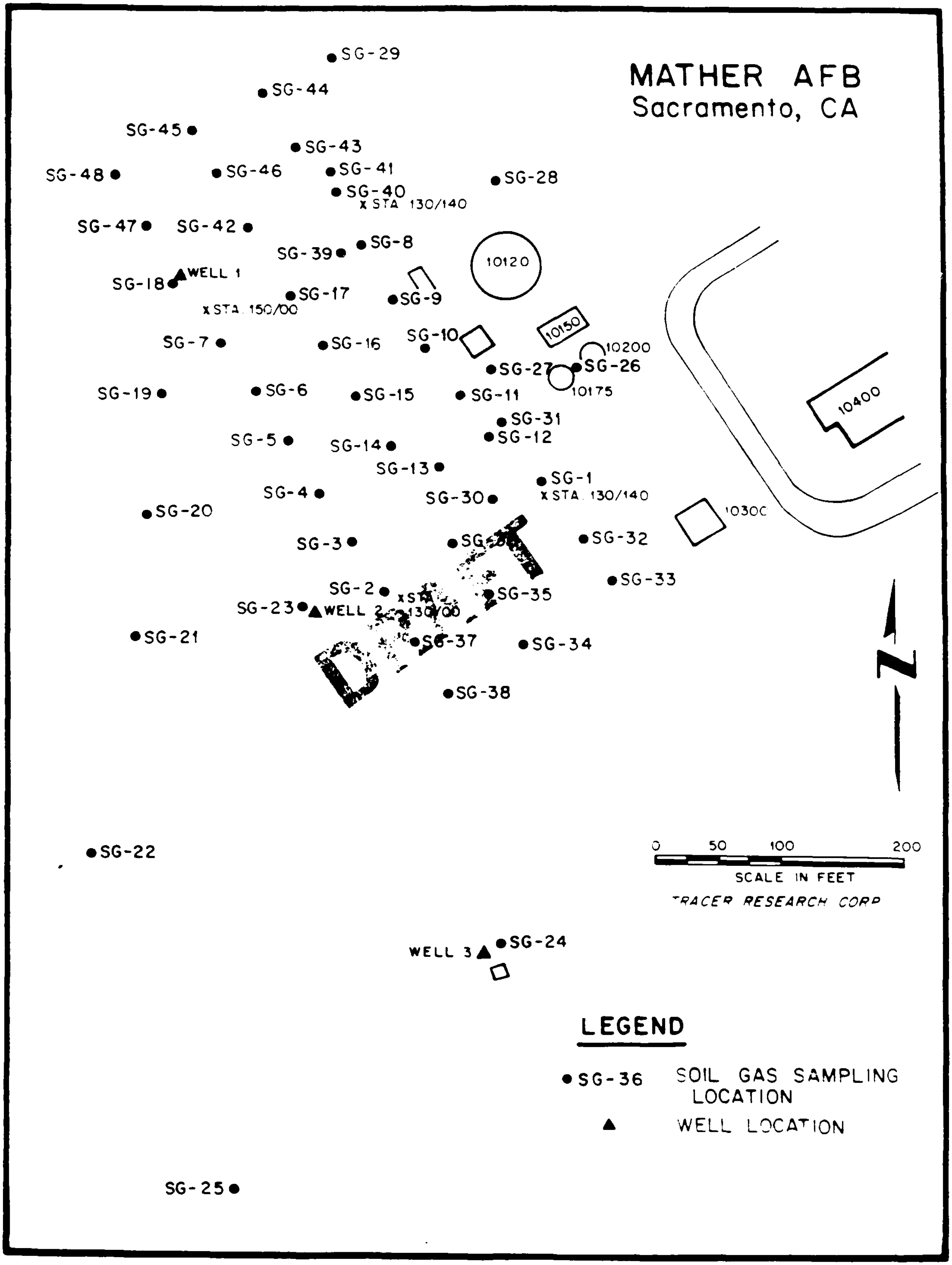
DS-1

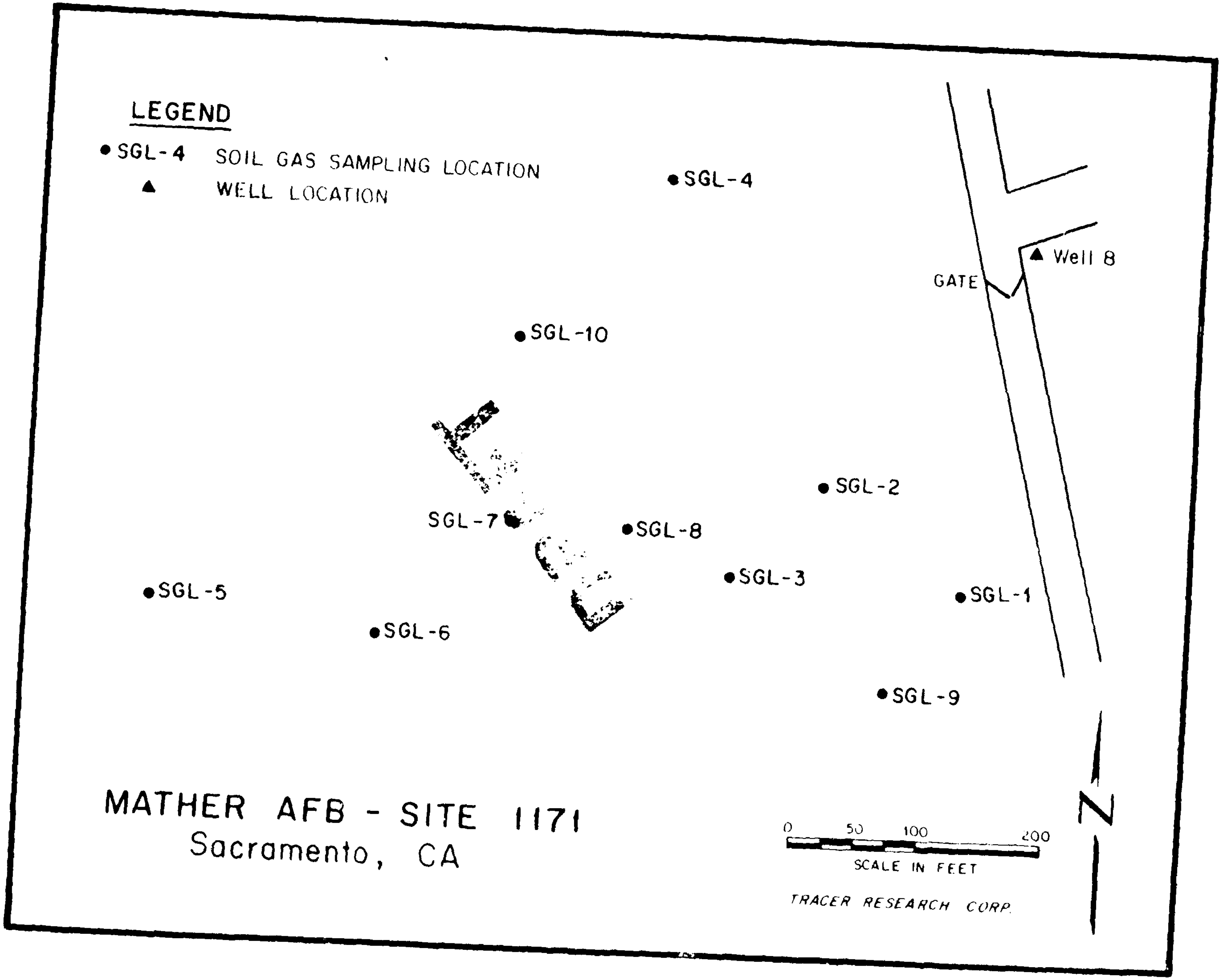
Notations: RF response factor
I interference with adjacent peaks
NA not analyzed

Summarized by: K. Tolman

Checked by: M. Krotenberg

Proofed by: L. Laplander


MATHER AFB
Sacramento, CA
SG-29
SG-44
SG-45
SG-43
SG-48
SG-46
SG-41
SG-40
X STA 130/140
SG-28
SG-47
SG-42
SG-39
SG-8
10120
SG-18
WELL 1
SG-17
X STA 150/00
SG-9
SG-7
SG-16
SG-10
10150
10200
SG-27
SG-26
10175
SG-19
SG-6
SG-15
SG-11
10400
SG-31
SG-12
SG-5
SG-14
SG-13
SG-1
X STA 130/140
SG-4
SG-30
SG-20
10300
SG-3
SG-32
SG-33
SG-2
SG-35
SG-23
WELL 2
SG-21
SG-37
SG-34
SG-38
DRAFT
N
SG-22
0
50
100
200
SCALE IN FEET
TRACER RESEARCH CORP
WELL 3
SG-24
LEGEND
SG-36
SOIL GAS SAMPLING LOCATION
WELL LOCATION
SG-25



LEGEND
SGL-4 SOIL GAS SAMPLING LOCATION
WELL LOCATION
SGL-4
Well 8
GATE
SGL-10
SGL-2
SGL-7
SGL-8
SGL-3
SGL-5
SGL-1
SGL-6
SGL-9
MATHER AFB - SITE 1171
Sacramento, CA
0 50 100 200
SCALE IN FEET
TRACER RESEARCH CORP.
N

DAT

FILM

8